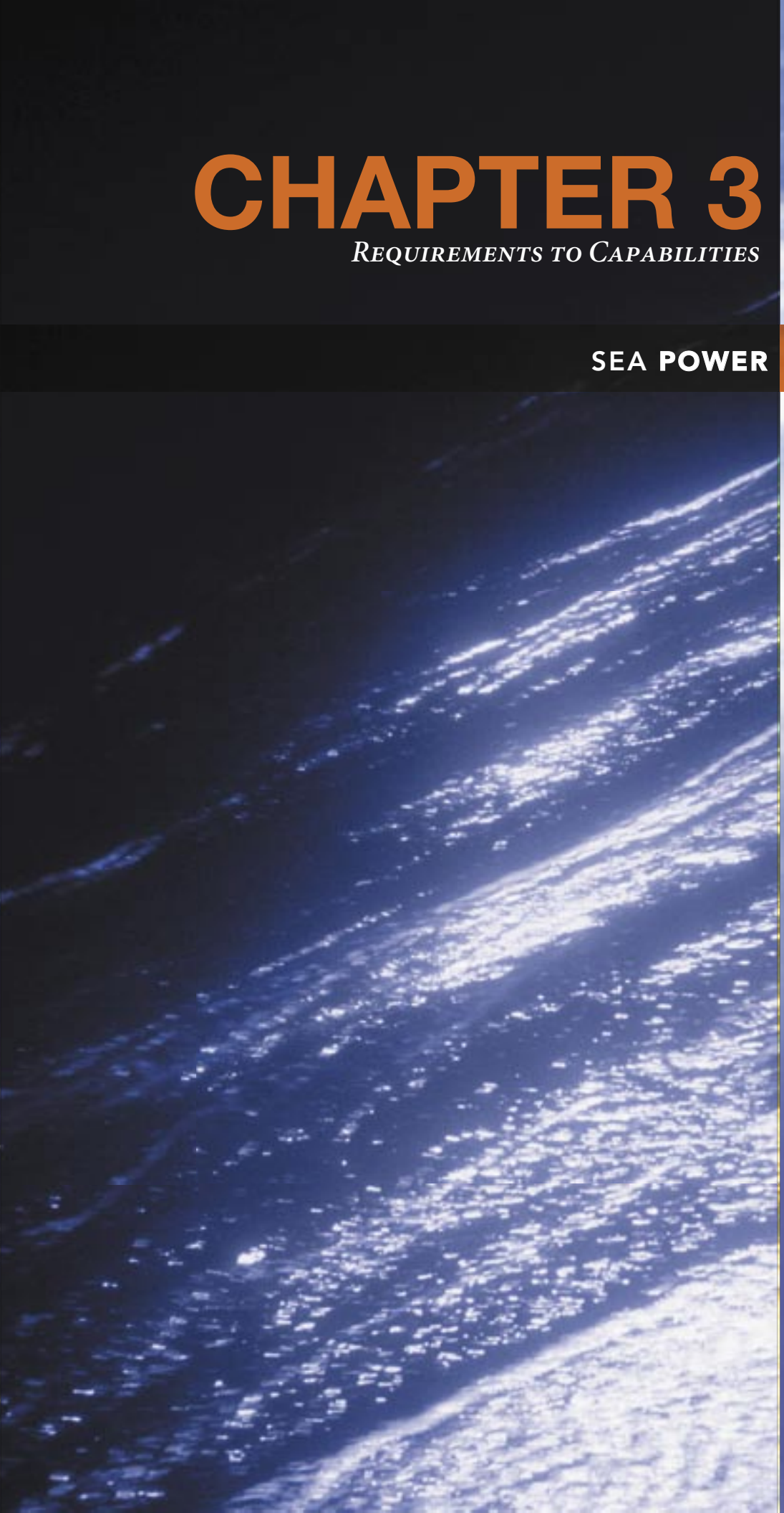
CHAPTER 3

Requirements to Capabilities



The "Arc of Instability" throughout the globe is substantially a maritime domain and, therefore, the Navy/Marine Corps Team is uniquely suited to respond and to ensure the Navy's ability to carry out Sea Strike, Sea Shield, and Sea Base operations. No more responsive, no more lethal force provides America's leaders with such a powerful range of options than the Navy/Marine Corps Team, As the Chief of Naval Operations' *Sea Power 21*… A Naval Vision states, "In a world of violent horizons, the Navy/Marine Corps team will serve America: anywhere, anytime, around the world, around the clock."

SEA STRIKE

PLATFORMS

Aircraft

AH-1Z Super Cobra and UH-1Y Huey Upgrade

Description

The AH-1 and UH-1 Upgrade Program will ensure that the MAGTF possesses credible rotary-wing attack and utility support platforms for the next 20 years. The H-1 Upgrade Program will provide 100 UH-1Ys and 180 AH-1Zs to the Warfighter. The H-1 Upgrade Program is designed to reduce life-cycle costs, significantly improve operational capabilities, and extend the service life of both aircraft. Eighy four percent commonality between the two aircraft will greatly enhance the maintainability and deploy-ability of the systems, with the capability to support and operate both aircraft within the same squadron structure.

The Upgrade Program replaces the current two-bladed rotor system on the UH-1N and AH-1W aircraft with a new four-bladed, all-composite rotor system, coupled with a sophisticated fully integrated, state-of-the-art cockpit. In addition to the new main rotor system and cockpit, the H-1 Upgrade will incorporate a new performance-matched transmission, a four-bladed tail rotor and drive system, and upgraded landing gear for both aircraft. The integrated glass cockpit with modern avionics systems will provide a more lethal platform, as well as enhanced joint interoperability through the digital architecture. Operational enhancements include a dramatic increase in range, speed, payload, and lethality of both aircraft, with a significant decrease in logistics footprint. The UH-1Y will operate at nearly twice the current range with more than double the payload. The AH-1Z will realize similar performance increases, with the ability to carry twice the current load of precision-guided munitions.

The H-1 Upgrade Program is an economical and comprehensive upgrade of both UH-1N and AH-1W helicopters, which will resolve existing operational safety issues, while significantly enhancing the capability and operational effectiveness of the attack and utility helicopter fleet. A key modernization effort, the H-1 Upgrade will provide a bridge until the introduction of a Joint Advanced Rotorcraft design. Due to substantial operational demands and aircraft attrition, both resulting from the Global War on Terrorism, the Marine Corps has adopted a "build new" strategy for the UH-1Y beginning in FY 2006 and is currently examining a "build new" strategy for the AH-1Z in order to preclude significant inventory shortfalls.

Status

The preliminary design review was approved in June 1997, and the

critical design review was completed in September 1998. Low rate initial production began in the first quarter FY 2004. Five EMD (Engineering and Manufacturing Design) aircraft have been produced, four of which will eventually become composite maintenance trainers and one aircraft (without an integrated avionics suite) which was used for live-fire test and evaluation. Phase I of OPEVAL concluded in November 2006, with Phase II scheduled to begin in Fall of 2007. Delivery of production aircraft began in January 2007. The UH-1Y is scheduled to meet IOC in the fourth quarter of FY 2008 while the AH-1Z will meet IOC in the third quarter of FY 2011. FOC for the UH-1Y is FY 2012, and FOC for the AH-1Z is FY 2018.

Developers
Bell Helicopter Textron; Fort Worth and Amarillo, Texas

AV-8B Harrier II+

Description
The AV-8B Harrier II is a single-seat, light attack aircraft that provides offensive air support to the MAGT. By virtue of its Vertical/Short Take-Off and Landing (V/STOL) capability, the AV-8B can operate from a variety of amphibious ships, rapidly constructed expeditionary airfields, forward sites (e.g., roads, FARPs), and damaged conventional airfields.

Two variants of the aircraft are in operational service: the Night Attack and the Radar/Night Attack Harrier. The Night Attack Harrier improved upon the original AV-8B design by incorporating a Navigation, Forward-Looking InfraRed (NAVFLIR) sensor, a moving map, night vision goggle compatibility, and a higher performance engine. The current Radar/Night Attack Harrier, or Harrier II+, has all the improvements of the Night Attack aircraft plus the AN/APG-65 multi-mode radar. The fusion of night and radar capabilities allows the Harrier to be responsive to the MAGTF's needs for expeditionary, night, and adverse weather offensive air support.

Status
The AV-8B Harrier Open Systems Core Avionics Requirement (OSCAR), which updates obsolete software and computer equipment, has entered service. OSCAR with Operational Flight Program H2.0 enables the AV-8B to employ both 1,000 and 500-pound variants of the Joint Direct Attack Munitions and provides tremendous improvements in radar and Litening advanced targeting pod capability.

The Litening advanced targeting pod provides the AV-8B with a significant improvement in its lethality and survivability. This third-generation, forward-looking infrared set, dual field-of-view TV seeker, and infrared marker provides improved target recogni-

tion and identification, while the laser designator and laser spot tracker provide precision targeting capability. Some Litening pods have also been equipped with a video downlink, which enables real-time video to be sent to ground-based commanders and forward-air controllers. This facilitates time-sensitive targeting and reduces the risk of fratricide and collateral damage.

In order to maintain a world-class training environment, the two-seat TAV-8B trainers are undergoing an upgrade program that adds new color displays, night vision goggle-compatible lighting, and a more powerful and reliable Rolls Royce Pegasus (408) engine. These improvements are increasing the training capability of the AV-8B fleet replacement squadron, as well as the abilities of our replacement pilots reporting to their fleet squadrons. The enhancements to the Harrier are a critical link for providing continued support to the MAGTF, until the JSF transition is complete.

Developers
Boeing: St. Louis, Missouri

CNATRA Naval Aviation Training Aircraft

Description
Commander, Naval Air Training Command's (CNATRA) mission, the on-time delivery of aviators (USN/USMC/USAF/USCG pilots and military flight officers) trained with leading edge technologies, is key to affordable fleet readiness and *Sea Power 21*. CNATRA's training aircraft inventory include the T-34C TurboMentor, T-6A Texan II, TH-57, T-2 Buckeye, T-45 Goshawk, T-44A Pegasus, TC-12 Huron, and the T-39 Sabreliner.

The first aircraft that all aspiring future USN/USMC pilots and flight officers fly is the T-34C TurboMentor (pilots) and the T-6A Texan II (flight officers). The T-34 started its Navy career in 1977 and has successfully and honorably completed its service at NAS Pensacola where it was a primary training aircraft for student Naval Flight Officers (NFOs). While still in use at NAS Whiting Field and NAS Corpus Christi, the TurboMentor is scheduled to be replaced with the T-6A with Avionics Upgrade Package (AUP), Texan II in FY 2011 at Whiting Field and FY 2015 at Corpus Christi.

The T-6A w/AUP Texan II is one component of the Joint Primary Aircraft Training System (JPATS) along with simulators, computer-aided academics, and a Training Integration Management System (TIMS). The aircraft, built by Raytheon Aircraft Company, is a derivative of the Swiss Pilatus PC-9 aircraft with a Pratt & Whitney PT-6A-68 engine, digital cockpit, Martin-Baker ejection seats, cockpit pressurization, and an onboard oxygen-generating system. In FY 2007 the Navy resumes full-scale procurement of the T-6A.

The T-2C Buckeye is used for the tactical maneuvering portion of

Strike/Strike-Fighter NFO training at NAS Pensacola. Designed in the mid-1950s, the Buckeye is scheduled to be divested by FY 2010 and it will be replaced by the T-45 Goshawk.

The T-45 Goshawk, the Navy version of the British Aerospace Hawk aircraft, is used for the intermediate and advanced portions of the Navy/Marine Corps pilot training program for jet carrier aviation and tactical strike syllabus. The T-45 replaces the T-39/T-2 as the training platform for the Strike Fighter Undergraduate Military Flight Office (UMFO) training program. Upgrades to the T-45 include converting all analog cockpits (T-45A) to digital cockpits (T-45C), resolving an engine surge issue to make the aircraft more fuel efficient and safer to operate, and extending service life until 2030. The T-45 is currently in production and the last aircraft will be procured in FY 2007.

The TH-57 Sea Ranger, a derivative of the commercial Bell Jet Ranger 206, is the Navy's sole advanced rotary training platform used at NAS Whiting Field. Upgrades to the TH-57 currently underway include energy attenuating seats, exceedence warning systems and a digital cockpit, guaranteeing aircraft availability and relevance to 2025.

The T-44A Pegasus and the TC-12 Huron are both twin-engine, pressurized, fixed-wing aircraft that are used for intermediate and advanced training for multi-engine aircraft. Future upgrades to both aircraft include wing wiring (T-44A), simulator visual upgrades (T-44A) and digital cockpit for the T-44A.

The T-39 Sabreliner is a multipurpose low-wing, twin-jet aircraft that has been in Naval service since the early 1990's. The primary mission of the Sabreliner is to conduct intermediate and advanced training for Strike/Strike-Fighter NFOs. The T-39 will also be replaced by the T-45 with a Virtual Mission Training System (VMTS) in the NFO syllabus.

CNATRA has recently charted a course to revolutionize NFO training by utilizing the T-6, the T-45C with VMTS and high fidelity simulators to train future NFO's. This new training program will capitalize on cutting edge technologies, while allowing the Navy to divest two aging platforms (T-2, T-39). The new program is planned for IOC at NAS Pensacola in FY 2010.

Status
T-45 and T-6 are currently in production. T-45 procurement programs for 12 aircraft in FY 2007, to meet an inventory requirement of 223. Production line shutdown scheduled for FY 2008. The planned inventory objective is 315 aircraft.

Developers
Ratheon (T-6); Wichita, Kansas
Boeing (T-45); St. Louis, Missouri

E-6B Mercury

Description
The E-6B platform, derived from the Boeing 707, provides the Commander, U.S. Strategic Command with the command, control, and communications capability needed for execution and direction of strategic forces. Designed to support a robust and flexible nuclear deterrent posture well into the 21st Century, the E-6B performs VLF emergency communications, the U. S. Strategic Command Airborne Command Post mission, and Airborne Launch Control of ground-based ICBMs. It is the Navy's only survivable means of nuclear command and control.

Status
In order to sustain and improve E-6B capability, the Block I modification program was developed. The contract for Block I was awarded to Rockwell Collins in March 2004 and it is designed to repair a number of aircraft deficiencies identified by U. S. Strategic Command. IOC is planned for FY 2012. In addition, the Internet Protocol and Bandwidth Expansion program was initiated in 2005 to modernize the E-6B platform as an airborne node of the Distributed National Command and Control system. IOC is planned for FY 2009.

Developers
Boeing; Seattle, Washington
Rockwell Collins; Cedar Rapids, Iowa
L3/VERTEX Aerospace; Madison, Mississippi

EA-6B Prowler Airborne Electronic Attack Aircraft (AEA)

Description
The EA-6B Prowler provides Airborne Electronic Attack (AEA) and Anti-Radiation Missile (ARM) capabilities against enemy radar and communications systems. In addition to enhancing strike capabilities of carrier air wings and Marine expeditionary forces, an expeditionary Prowler force has provided AEA capability during numerous joint and allied operations since 1995 against traditional and non-traditional target sets in support of ground forces. These capabilities continue to be demonstrated in the Global War on Terror where EA-6B operations in Afghanistan and Iraq protect coalition forces and disrupt critical communications links. The enormous demand for AEA in Operation Enduring Freedom and Operation Iraqi Freedom has driven EA-6B utilization rates to record levels.

Status
The Improved Capability (ICAP) III upgrade reached IOC in September 2005 with the "Cougars" of VAQ-139. This generational leap in electronic attack capability deployed for the first time in

2006. The ICAP III includes a completely redesigned receiver system (ALQ-218), new displays, and MIDS/Link-16, which dramatically improve joint interoperability. Additionally, the ALQ-218 will also form the heart of the EA-18G "Growler" AEA system – the follow on platform for the EA-6B.

Developers
Northrop Grumman Corporation; Bethpage, New York

EA-18G Growler Airborne Electronic Attack Aircraft

Description
The EA-18G Growler will replace the EA-6B Prowler as DoD's sole tactical electronic attack aircraft. Like the Prowler, the EA-18G will provide full-spectrum electronic attack to counter enemy air defenses and communication networks. The Growler will maintain a high degree of commonality with the F/A-18F, retaining the latter's inherent strike-fighter and self-protection capabilities while providing air-to-air self-protection to free other assets for other strike-fighter tasking.

Status
The EA-18G Growler is on schedule and under budget as it progresses towards 2009 IOC. The aircraft completed Critical Design Review in April 2005 and initial procurement of the first four aircraft began in FY 2006. The Growler's first flight was flown one month ahead of schedule in August 2006 and is currently undergoing test and development at NAS Patuxent River, Maryland. An inventory objective of 84 aircraft is planned to support a 10-squadron carrier based force structure.

Developers
Boeing; St. Louis, Missouri
Northrop Grumman; Bethpage, New York

F/A-18 A-D Hornet Strike-Fighter Aircraft

Description
The F/A-18 Hornet is Naval Aviation's principal strike-fighter. This state-of-the-art, multi-mission aircraft serves the Navy and Marine Corps, as well as the armed forces of several allied countries. Its reliability, maintainability, safety record, high performance, and multiple weapons-delivery capability highlight the Hornet's success. Budgeted improvements to the original Hornet A/C/D variants have provided significant warfighting improvements, including addition of the Global Positioning System (GPS), Multi-Functional Information Distribution System (MIDS), AIM-9X Sidewinder/Joint Helmet-Mounted Cueing System, Combined

Interrogator Transponder, Joint Direct Attack Munition/Joint Stand-Off Weapon (JDAM/JSOW) delivery capability, and Digital Communication System for close-air support. The aircraft's weapons, communications, navigation, and Defensive Electronic Countermeasures systems are also being upgraded to ensure combat relevance.

Status
Although the FA-18A through Ds are out of production, the existing inventory of 673 Navy and Marine Corps aircraft will continue to comprise half of Naval Aviation's strike assets through 2012, and will serve in active squadrons until 2023.

Developers
Boeing; St. Louis, Missouri
General Electric; Lynn, Massachusetts

F/A-18E/F Super Hornet Strike-Fighter Aircraft

Description
The FA-18E/F Super Hornet provides significant improvements in combat range, payload, survivability, and growth capacity required to keep the strike-fighter force lethal and relevant well into the 21st Century. There is extensive commonality of weapons systems, avionics, and software among F/A-18 variants, and the infrastructure supporting the Super Hornet builds upon existing organizations. The FA-18E/F is replacing the F-14 and early model FA-18s. The lethality, flexibility, reliability, and survivability of the FA-18E/F make it the right aircraft to fulfill missions associated with regional and littoral conflicts.

Status
Aircraft FA-18E-1 first flew on 29 November 1995 and full-rate production deliveries commenced in October 2001. The Navy awarded a multi-year contract, compared to five single-year contracts, for procurement of 222 aircraft from 2000-2004, saving taxpayers 7.4 percent ($700 million). A second multi-year contract was awarded in FY 2004 for 210 aircraft procured in 2005 through 2009, saving $1 billion over the single-year price. In June 2002, Navy awarded a multi-year contract for production of 480 engines, saving another $51 million. The first Super Hornets to deploy were onboard USS *Abraham Lincoln* (CVN 72) in the summer 2002. VFA-115 (FA-18E) led strikes into Iraq on the opening night of Operation Iraqi Freedom. The second and third Super Hornet squadrons to deploy, VFA-14 (FA-18E) and VFA-41 (FA-18F), flew from USS *Nimitz* (CVN 68) in spring 2003. This deployment initiated EOC for the Shared Reconnaissance Pod (SHARP), the Joint Helmet Mounted Cueing System (JHMCS), the Multifunctional Information Distribution System (MIDS), and the Advanced Targeting Forward-Looking Infra-Red (ATFLIR) system. ATFLIR reached IOC with VFA-102 in September 2003. Lot 26

(and beyond) FA-18E/Fs will have Active Electronically Scanned Array (AESA) Radar Systems. Pacific Fleet aircraft are based at NAS Lemoore, California and forward deployed to NAF Atsugi, Japan. NAS Oceana, Virginia and MCAS Cherry Point, North Carolina have been chosen as Atlantic Fleet home bases.

Developers
Boeing; St. Louis, Missouri
General Electric; Lynn, Massachusetts

F-35 Joint Strike Fighter (JSF)

Description
The JSF F-35 Lightning II program will deliver a transformational family of next-generation strike aircraft, combining stealth and enhanced sensors to provide lethal, survivable, and supportable tactical jet aviation strike fighters that complement the FA-18E/F. The Navy Carrier Variant (CV), the Marine Corps Short Takeoff and Vertical Landing (STOVL) and Air Force Conventional Takeoff and Landing (CTOL) "family of aircraft" design share a high level of commonality while meeting U.S. service and allied partner needs. The keystone of this effort is a mission systems avionics suite that delivers unparalleled interoperability among U.S. armed services and coalition partners. Agreements for international participation in System Development and Demonstration (SDD) have been negotiated with Australia, Canada, Denmark, Italy, the Netherlands, Norway, Turkey, and the United Kingdom. Security Cooperation Partnership memorandums of understanding have been established with Israel and Singapore.

Status
The JSF is in its sixth year of a planned 12-year SDD program. The 31 March 2006 Defense Acquisition Board approved: long-lead funding for LRIP Lot 1 CTOL aircraft; general framework for International Participation in Operational Test; close-out of prior Block 2 net-centric capabilities tasking; and decision criteria for LRIP 1 full funding and LRIP 2 long-lead funding. First CTOL variant SDD flight is scheduled for first quarter FY 2007. First STOVL flight is scheduled for second quarter FY 2008, and the first CV flight in second quarter FY 2009. Marine Corps has scheduled IOC in 2012 and the Navy in 2015. All key performance parameters are projected to be met at IOC. The DoD Base Realignment and Closure Commission 2005 directed the first JSF Integrated Training Center to be at Eglin Air Force Base, Florida.

Developers
Lockheed Martin; Fort Worth, Texas
Pratt Whitney (PW F135 engine); East Hartford, Connecticut

MV-22 Osprey

Description

The MV-22 Osprey is a tilt-rotor, Vertical/Short Take-Off or Landing (V/STOL) aircraft designed as the medium-lift replacement for the Vietnam-era CH-46E and CH-53D helicopters. The MV-22 design incorporates advanced technologies in composite materials, survivability, airfoil design, fly-by-wire controls, digital avionics, and manufacturing. The MV-22 is capable of carrying 24 combat-equipped Marines or a 10,000-pound external load, and has a strategic self-deployment capability of 2,100 nautical miles with a single aerial refueling. The MV-22 flight capabilities are far superior to the CH-46E it replaces in that is has twice the speed, three times the payload, and six times the range. The MV-22's 38-foot proprotor system and engine/transmission nacelle mounted on each wingtip allow it to operate as a helicopter for take-off and landing. Once airborne, the nacelles rotate forward 90 degrees, transitioning the MV-22 into a high-speed (240+ knots), high-altitude (25,000 feet), fuel-efficient turboprop aircraft. The MV-22 represents a revolutionary change in aircraft capability to meet a plethora of expeditionary and unique missions for the 21st Century. A Special Operation Forces variant, the CV-22, is being procured by the U.S. Air Force and SOCOM.

Status

The MV-22 completed OPEVAL in June 2005 and designated operationally suitable and operationally effective. The aircraft was subsequently approved for Milestone III and full-rate production in September 2005. The FY 2007 budget contains fourteen MV-22s and two CV-22s. Production is currently ramping up to full-rate. Congress authorized a Joint five-year, multi-year procurement contract (FY 2008 - FY 2012) which will award during the second quarter of FY 2007. The program of record includes 360 MV-22s for the Marine Corps, 50 CV-22s for USSOCOM, and 48 MV-22s for the Navy, for a total of 458 V-22 aircraft. The Osprey will reach IOC in FY 2007. Three CH-46E squadrons (HMM-263 /HMM-162/HMM-266) have been retired and have entered the transition and training to become operational MV-22 squadrons. HMM-263 and HMM-162 have been redesignated as VMM squadrons, and VMM-263 is set for the first operational MV-22 deployment in 2007.

Developers

Bell Helicopter Textron; Fort Worth, Texas
Boeing Defense and Space Group, Helicopter Division; Philadelphia, Pennsylvania
Rolls Royce; Indianapolis, Indiana

Navy Unmanned Combat Air System (N-UCAS)

Description
Originating as two prototype developments for the Navy and Air Force, it became a DARPA managed joint program (J-UCAS) in FY 2004. Program management transferred to the Air Force in FY 2006. The 2005 QDR and other program decisions restructured the J-UCAS program to initiate development of an "unmanned longer-range carrier-based aircraft ... to provide greater standoff capability ... and increase naval reach and persistence." Program management and associated technologies were transferred to the Navy in August 2006. The CV demonstration will mature technologies and reduce risk in preparation for a follow-on acquisition program. The primary operational objective for the Navy is for a carrier based, multi-mission unmanned Low Observable vehicle that conducts surveillance, reconnaissance, strike, and suppression of enemy air defenses. The Navy's emphasis at IOC is on the penetrating surveillance/reconnaissance role, where target identification and precise location capability best leverage the significant Navy investment in stand-off weapons. The acquisition program will field Navy UCAS in the 2021 time frame.

Status
The program intends to hold a limited competition to develop, build and test a CV-based UCAS Demonstration System. Participants will be limited to the Boeing Company and Northrop Grumman Systems Corporation. The Demonstration System effort will be structured to mature critical technologies and reduce risk for aircraft carrier integration of an operationally relevant UCAS with Low Observable platform. This will include Carrier Controlled Approach operations, launch and recovery operations, deck operations and supportability. Activities will focus on a shipboard demonstration in 2013. The Program Office anticipates release of a request for proposal in early FY 2007.

Developers
To be determined.

VH-71A Presidential Helicopter Replacement

Description
The VH-3D/VH-60N presidential helicopter replacement, recently designated VH-71A, is a conventional helicopter based on the Agusta Westland EH-101. It will provide safe and timely transportation for the president and vice president of the United States, foreign heads of state, and others as directed by the White House Military Office. When the president is onboard Marine One, this aircraft is the Commander-in-Chief's primary command and

control platform and must provide him with the flexibility and capabilities necessary to execute the duties of his office. Its capabilities, which will be delivered in two increments, are split into four functional areas: aircraft operations, communications, survivability, and presidential accommodations. VH-71A will have increased capabilities in these areas, while retaining its core capabilities carried forward from the VH-3D and VH-60N.

Status
Milestone B/C Defense Acquisition Board held on 12 January 2005. Milestone B was approved for Increment I and II System Development and Demonstration (SDD). Milestone C was approved for five pilot production Increment I aircraft. The SDD Contract for Increment I and II was awarded to Lockheed Martin on 28 January 2005. IOC is planned for first quarter FY 2010.

Developers
Lockheed Martin; Agusta, Westland
Lockheed Martin; Owego, New York
Bell Helicopter
General Electric

SURFACE AND EXPEDITIONARY WARFARE SHIPS AND CRAFT

Aircraft Carriers

CVN 68, CVN 21 *Nimitz* and CVN 21 Program

Description
There are currently nine *Nimitz*-class nuclear-powered aircraft carriers in active service, comprising more than three-quarters of the U.S. Navy's aircraft carrier force. Since USS *Nimitz* (CVN 68) was commissioned in 1975, these ships replaced, on a one-for-one basis, an ever-aging fleet of fossil-fueled carriers. In doing so, they have allowed the Navy to maintain an operational fleet that meets the Fleet Response Plan commitments, as well as the presence requirements for Combatant Commanders in support of national goals. The mission of the *Nimitz* -class aircraft carrier is to support and operate the aircraft that engage in attack, survey, and conduct electronic warfare against sea-borne, air-borne, and land-based targets in support of Joint and Coalition forces. America's carriers deploy throughout the world in support of U.S. strategy and commitments. Additionally, our carriers continue to play an increasingly important role as the Navy adjusts its emphasis toward the world's littoral regions. This becomes especially important as permanent forward-deployed, land-based forces are brought home to the United States.

While the baseline *Nimitz* design is still one of the most potent

warfighting machines ever made, little has been invested in research and development during the past 40+ years that could have incrementally incorporated leading-edge technologies and systems into these premier capital ships. It is primarily for this reason that the Navy has embraced a program to develop, acquire, and operate a new-design aircraft carrier to replace all U.S. aircraft carriers in service today. In 1993, in an effort to ensure that a new class of aircraft carriers would capture the elements of the Revolutions in Military and Business Affairs, the Navy established a future sea-based air platforms working group to investigate the requirements and technologies and systems available at the time. Based primarily on these initial studies, the Navy established the CVN 21 Program to develop an evolutionary, next-generation, nuclear-powered aircraft carrier.

CVN 78, the lead ship of the CVN 21 Program, is scheduled for delivery to the Fleet in late 2015. The follow ships, CVN 79 and CVN 80, will be built as CVN 78 repeats at four-year intervals and are expected to deliver to the fleet in 2019 and 2023, respectively. Following this and subsequent three-ship blocks, a fifth year will be inserted into the construction cycle to allow for the insertion of new technologies that have evolved in the previous decade. This class of aircraft carriers will incorporate such advanced features as: a new, more efficient nuclear propulsion plant, an Electro-Magnetic Aircraft Launch System (EMALS), Advanced Arresting Gear (AAG), and a nearly three-fold increase in electrical generation capacity when comparing it to a *Nimitz*-class carrier. These improvements, coupled with a slightly expanded Flight Deck and other topside changes designed to increase operational efficiency, will provide significantly higher sortie generation rates. At the same time, maintenance and manpower requirements for the ship will be greatly reduced from today's levels, allowing the Navy to reap over $5 billion dollars in life-cycle cost savings per ship over their 50-year service life.

Quality of life improvements for the crew are of utmost importance for Navy leaders, as it is anticipated that this class of aircraft carrier will sail the world's oceans for the next 100 years. The principal design objectives for the ships of the CVN 21 Program are to provide a flexible infrastructure that will facilitate the seamless insertion of new warfighting capabilities as they become available, and to continue reducing total ownership costs. Meeting these objectives is a high priority for the Navy, and ensures that our aircraft carriers remain the centerpiece of *Sea Power 21*, and that they are fully capable of meeting the daunting operational requirements well into the next century.

Status

USS *George H.W. Bush* (CVN 77), the tenth and final ship of the *Nimitz*-class, is currently under construction at the Northrop Grumman Newport News Shipyard in Newport News, Virginia. CVN 77 was christened and launched in October 2006, with delivery expected in November 2008. CVN 77 is a modified-repeat

of the USS *Ronald Reagan* (CVN 76) and is the numerical replacement for USS *Kitty Hawk* (CV 63), which retires in 2008 after 47 years of service. All aircraft carriers acquired subsequent to CVN 77 will be developed by the CVN 21 Program. Delivery of the lead ship, CVN 78, is scheduled for 2015. CVN 78 is the numerical replacement for the Navy's first nuclear-powered aircraft carrier, USS *Enterprise* (CVN 65), which is scheduled for decommissioning in 2013, following more than 52 years of operational service. CVN 79, the second ship of the class, is scheduled for delivery in 2019.

Developers
Northrop Grumman; Newport News, Virginia

Submarines

Advanced SEAL Delivery System (ASDS)

Description
ASDS, a combat submersible, is 65 feet long, is operated by a two-man crew, and can carry Navy SEAL personnel or other Special Operations Forces (SOF). The ASDS is a multi-mission platform capable of personnel delivery or intelligence operations. It is launched from one of two host submarines, USS *Charlotte* (SSN 766) or USS *Greeneville* (SSN 772), much like the Deep Submergence Rescue Vehicle (DSRV). The ASDS eliminates the extended exposure to water and increased atmospheric pressure inherent with in-service wet submersible SEAL Delivery Vehicles (SDVs) and carries improved sensors and communications equipment, resulting in improved personnel and equipment performance.

Status
The first ASDS is home ported with SEAL Delivery Vehicle Team ONE (SDVT ONE) in Pearl Harbor, Hawaii. The ASDS completed OPEVAL in the summer of 2003 and conducted training exercises in the Pacific—proving the capability to operate from a forward operating base. Progress toward building the full complement of ASDSs is dependent on improving the operational reliability of ASDS Hull 1. Future SSGNs and *Virginia* (SSN 774)-class submarines will host the ASDS as the program proceeds.

Developers
Northrop Grumman; Annapolis, Maryland

SENSORS

Airborne

APG-79 Active Electronically Scanned Array (AESA) Radar System

Description
APG-79 AESA Phase I upgrade provides multi-mode function flexibility while enhancing performance in the air-to-air arena, hostile electronic countermeasures environments, and air-to-ground targeting functions. Phase II will provide significant electronic warfare improvements to target hostile emitters while providing aircraft electronic protection and electronic attack functions. Growth provisions will allow for reconnaissance capability through the use of synthetic aperture radar technology and improved hardware and software.

Status
The APG-79 completed subcontractor competition in November 1999, and the Engineering and Manufacturing Development (EMD) contract was awarded in February 2001 to reach IOC in 2007. AESA Total Phase I program procurement is 415 systems, 280 forward fit and 135 retrofit. AESA Milestone C and LRIP II approval was received in January 2004, for initial delivery with Lot 27 Super Hornets in FY 2005.

Developers
Boeing; St. Louis, Missouri
Raytheon; El Segundo, California

ASD-12V Shared Reconnaissance Pod (SHARP)

Description
The SHARP replaces the F-14 Tactical Airborne Reconnaissance Pod System (TARPS) and will be carried on the F/A-18E/F to support strike warfare, amphibious warfare, and anti-surface warfare decision-making. SHARP provides near-real time, dual-band EO/IR medium and high altitude standoff imagery. SHARP incorporates NITF formatted day/night digital imagery utilizing the USQ-123 Common Data Link-Navy (CDL-N) for real time connectivity. SHARP deployed with VFA-41 in support of Operation Iraqi Freedom in 2003 and with VFA-102 as part of the forward-deployed naval forces in Japan.

Status
SHARP MAS EO/IR completed IOC in September 2006.

Developers
Raytheon; Indianapolis, Indiana
Recon Optical Inc.; Barrington, Illinois
L3Comm West; Salt Lake City, Utah

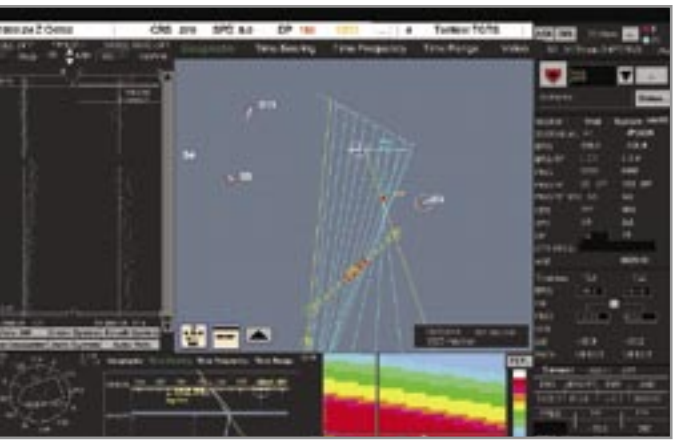
ASQ-228 Advanced Targeting Forward-Looking Infra-Red (ATFLIR)

Description
The ATFLIR will provide the F/A-18A+/C/D/E/F with a significantly enhanced capability to detect, track, and attack air and ground targets. New laser-guided and GPS standoff weapons systems and higher-altitude attack profiles require improved performance over the current AAS-38/46 Targeting FLIR. The ATFLIR is designed to provide a quantum leap in operational effectiveness to fully support the standoff precision strike mission. Improved reliability and maintainability will increase operational availability while reducing total ownership costs.

Status
ATFLIR completed Phase I OPEVAL in September 2003 and was determined to be operationally suitable and effective, and was recommended for further fleet introduction. ATFLIR achieved IOC with VFA-102 in September 2003 and demonstrated its combat capability in support of Operation Iraqi Freedom. The program was awarded Milstone III/FRP decision on 17 October 2003. The Navy will procure 82 ATFLIR in FY 2007. Program objective is 410 systems.

Developers
Boeing; St. Louis, Missouri
Raytheon; El Segundo, California

Subsurface



BYG-1 Submarine Combat Control System

Description
The BYG-1 is the combat control system common across all submarine platforms [except *Ohio*-class (SSBN 726)] which incorporates tactical control, weapon control, and Tactical Local Area Network (TacLAN) functions into a single procurement program. BYG-1 allows the submarine force to rapidly update the ship safety tactical picture, integrates the common tactical picture into the battle group, improves torpedo interfaces, and provides tactical Tomahawk capability. BYG-1 systems will be updated continuously with hardware enhancements to address COTS obsolescence and capability improvements as defined by the Advanced Processor Build (APB) process. These updates are referred to as Tech Insertion (TI) kits and are differentiated by year of development (i.e., TI00, TI04, and so on). The TI upgrades provide the baseline for all future BYG-1 procurements. In addition, this budget also provides tech insertion "kits" to update existing BYG-1 platforms.

Status
BYG-1 is scheduled to be installed on all attack-and guided-missile submarines by FY 2012.

Developers
Raytheon; Portsmouth, Rhode Island
General Dynamics Advanced Information Systems; Manassas, Virginia
Progeny; Manassas, Virginia
Lockheed Martin; Eagan, Minnesota

WEAPONS

Airborne

AGM-88E Advanced Anti-Radiation Guided Missile (AARGM)

Description
The latest evolution of the HARM weapon system is the Navy's AGM-88E AARGM. The AGM-88E is an ACAT-IC SDD program with a planned IOC in FY 2009. AARGM was successfully demonstrated as an ATD and Quick Bolt ACTD sponsored by European Command. The AGM-88E project upgrades legacy HARM with a new guidance section incorporating multi-sensor, multi-spectral digital anti-radiation homing detection capability, GPS/INS guidance, and a millimeter wave terminal seeker. AARGM also includes a netted situation awareness/targeting capability and weapon impact assessment reporting via direct connectivity with national technical means. The U.S. DoD and the Ministry of Defense of the Republic of Italy have signed an international Memorandum of Agreement for cooperative development of AGM-88E. The AARGM system will provide U.S. Navy/Marine Corps and the Italian Air Force with a transformational and affordable Destruction of Enemy Air Defenses (DEAD) and time-sensitive strike capability upgrade to HARM. The legacy HARM program was a joint-service program with Navy as lead service. HARM is Navy's only anti-radiation, defense-suppression, air-to-surface missile. Employed successfully in naval operations for decades, HARM is designed to destroy or suppress broadcasting enemy electronic emitters, especially those associated with radar sites used to direct anti-aircraft guns and surface-to-air missiles. AGM-88B (Block IIIA) and AGM-88C (Block V) are the currently fielded fleet configurations of HARM.

Status
FY 1992 was the last year of production of Navy all-up HARM rounds. AGM-88E AARGM planned IOC is FY 2009. The AGM-88E program plans conversion of 1,750 older AGM-88B weapons for the F/A-18C/D/E/F and EA-18G aircraft.

Developers
AARGM: ATK Missile Systems Company, Inc;
Woodland Hills, California
HARM: Raytheon; Tucson, Arizona

AGM-154 Joint Standoff Weapon (JSOW)

Description
A new family of Stand-off Outside Point Defense (SOPD) weapons was added to the fleet with introduction of JSOW in 1999. A joint Navy/Air Force weapon-development program, with Navy as lead service, JSOW replaces five types of the aging air-to-ground weapons in the inventory. With war-proven effectiveness, the JSOW family of precision-guided weapons allows naval aircraft to attack targets at increased standoff distances, greatly increasing aircraft and aircrew survivability. JSOW is useable in adverse weather conditions and gives aircrews the ability to attack multiple targets in a single sortie. The JSOW family uses a common weapon body or "truck" for all variants. The AGM-154A carries BLU-97 combined-effect bomblets for use against area targets. AGM-154C (Unitary) was developed with a penetration warhead (BROACH).

Status
AGM-154A reached IOC in 1999, and the AGM-154C variant achieved IOC in FY 2005. Procurement of JSOW C continues across the FYDP with a total of 3,879 units FY 2006-2013.

Developers
Raytheon; Tucson, Arizona

AIM-9X Sidewinder Short-Range Air-to-Air Missile

Description
The AIM-9X Sidewinder is a joint Navy/Air Force program that provides a major upgrade to the existing AIM-9M missile by integrating a steering focal plane array seeker, an extremely agile airframe, and state-of-the-art signal processors. This enhanced capability results in significantly improved target acquisition, missile kinematics, and improved infrared counter-countermeasures performance. The AIM-9X Pre-Planned Product Improvement (P3I) Program will result in SRM air superiority well into the 21st Century. Coupled with the Joint Helmet-Mounted Cueing System, the Sidewinder's high off-boresight capability revolutionizes employment of these air-to-air missiles. The AIM-9X is planned for the Joint Strike Fighter and integrated on F/A-18A+/C/D Hornet and the F/A-18E/F Super Hornet.

Status
The AIM-9X Program is a post-Milestone C program. Achieving IOC in February 2004, the missile is being produced as part of Lot 5 and is ahead of schedule. AIM-9X BLOCK II is a P3I program that will incorporate a redesigned Advanced Optical Targeting Device (AOTD) to address obsolescence and incorporation of datalink capability. AIM-9X BLOCK II production will begin FY 2009. Planned procurement across the FYDP is 1,232 missiles, in addition to 174 in FY 2007.

Developers
Raytheon; Tucson, Arizona

AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM)

Description
AIM-120 AMRAAM is an all-weather, all environment radar guided missile developed by the U.S. Air Force and Navy. The missile is currently deployed on the F/A 18A+/C/D Hornet and the F/A-18E/F Super Hornet, and will be deployed on the EA-18G and Joint Strike Fighter (JSF) aircraft. Entering the fleet in September 1993, AMRAAM has evolved to maintain air superiority through Pre-Planned Product Improvement (P3I) programs. This modernization plans include clipped wings for internal carriage, a propulsion enhancement program, increased warhead lethality, and enhanced electronic counter-countermeasures (ECCM) capabilities through hardware and software upgrades. Most importantly to the warfighter, the missile has improved capabilities against low and high altitude targets in an advancing threat environment.

Status
The AMRAAM is a post-Milestone C program. Deliveries of AIM-120C began reaching the fleet in 1996. The AIM-120C7 missile variant is a product of P3I and is scheduled to achieve IOC in third quarter FY2007. Continued procurement of the AMRAAM, with a P3I contract for the AIM-120D missile, will provide significant network-centric warfare capability, GPS, improved high-off-boresight capability, and missile kinematics. AIM-120D IOC is scheduled for first quarter FY 2010. Planned procurement across the FYDP is 550 missiles, in addition to 150 missiles planned for FY 2007 (BES08 Data).

Developers
Raytheon; Tucson, Arizona

GBU-10/12/16/24 Laser-Guided Bomb (LGB)

Description
The LGB is a joint Navy/Air Force effort with U.S. Air Force as lead service for procurement. LGBs are comprised of a MK-80/BLU-series warhead fitted with a laser-guidance kit, consisting of a Computer Control Group (CCG) mounted on the nose of the bomb body and a rear-mounted Airfoil Group (AFG). The warhead is initiated by an electronic fuse housed in the aft section of the bomb body. The seeker, housed in the CCG, senses laser energy and sends signals to the CCG canards to guide the weapon to the reflected energy spot. The laser energy can be applied to the target by ground or airborne designators, and even self-designated by laser-configured aircraft. LGBs include Paveway I, which has been retired; Paveway II, the current variant that uses MK-80/BLU series general-purpose bomb bodies; and Paveway III (GBU-24) that uses the BLU-109 bomb body and incorporates state-of-the-art guidance and control features. Paveway II LGBs are designated GBU-12 (500-pound class), GBU-16 (1,000-pound class), and GBU-10 (2,000-pound class). The resultant precision strike weapon will provide increased range and allow delivery through adverse weather using GPS/INS and Laser guidance systems.

Status
In response to an urgent USMC request for a through-the-weather, precision weapon, DoN awarded a contract for a Dual Mode Laser Guided Bomb kit to Lockheed Martin in November 2005. Approximately 10,000 Dual Mode Kits will be procured through the life of the program.

Developers
Raytheon Company; Tucson, Arizona
Lockheed Martin; Bethesda, Maryland

GBU-31/32/38 Joint Direct Attack Munition (JDAM)

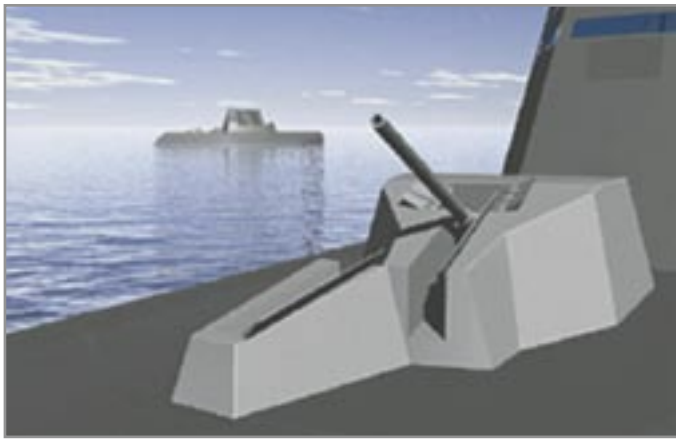
Description
The JDAM is a multi-service program, with U.S. Air Force as lead service, for a strap-on, Global Positioning System (GPS)-aided, Inertial Navigation System (INS) guidance kit to improve accuracy of existing 500-pound, 1,000-pound, and 2,000-pound general-purpose and penetrator bombs (BLU-109) in all weather conditions. JDAM is a true force multiplier, allowing a single aircraft to attack multiple targets from a single release point, and has been proven in operations in Iraq, Kosovo, and Afghanistan.

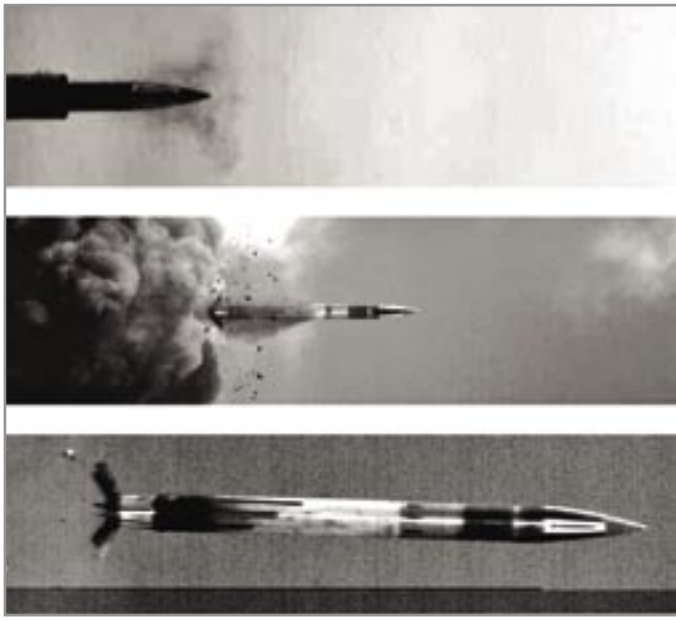
Status
LRIP for the 2,000-pound kits began in FY 1997, and Milestone III was reached in FY 2001. The 1,000-pound JDAM kit reached IOC in FY 2002, and IOC for the 500-pound weapon occurred during second quarter of FY 2005. Procurement of JDAM continues across the FYDP until FY 2012.

Developers
Boeing; St. Louis, Missouri

Subsurface, Surface, and Expeditionary

Advanced Gun System (AGS)





Description
The 155mm AGS is planned for installation in DDG 1000 to provide precision, volume, and sustained fires in support of distributed joint and coalition forces ashore. AGS is a fully integrated, automatic gun and magazine weapon system that will support the DDG 1000 Naval Surface Fire Support mission. Each system will be capable of independently firing up to 10 rounds per minute from a fully automated magazine. The AGS program includes development of the GPS-guided 155mm Long-Range Land-Attack Projectile (LRLAP), the first of a family of AGS munitions. AGS, fully integrated into DDG 1000, is designed to meet the reduced manning and radar-signature requirements of DDG 1000 ship program.

Status
The program started in FY 1999 and is an integral part of the DDG 1000 program. The first gun system is scheduled for delivery to support the first DDG 1000 fleet delivery in FY 2012.

Developers
BAE Systems; Minneapolis, Minnesota

BGM-109/UGM-109 Tomahawk Land-Attack Missile (TLAM)

Description
The TLAM is the Navy's premier, all-weather, long-range, subsonic land-attack cruise missile deployed on surface warships and attack submarines. Block IV Tactical Tomahawk (TACTOM), BGM-109E/UGM-109E, an upgrade from the original TLAM Block III missile, preserves Tomahawk's long-range precision-strike capability while significantly increasing responsiveness and flexibility at significantly lower cost. TACTOM improvements include:

• In-flight retargeting

• Ability to loiter over the battlefield and to respond to emergent targets

• Ability to monitor the health and Status of the missile in flight via a satellite data link

• Battle Damage Indication Imagery capability that gives a digital look-down "snapshot" of the battlefield and sends it via satellite data link

• Global Positioning System (GPS) mission planning onboard the launch platform, enabling the shooter to plan and rapidly execute strike missions against emergent battlefield targets

• Improved anti-jam GPS that minimizes the susceptibility to jamming

• A missile design that allows for alternative payloads, including smart sub munitions, a penetrator warhead, and multiple response warhead

The TACTOM program began in FY 1998 and reached IOC in FY 2004. The Navy completed the first ground test of the TACTOM missile in 2002, vertically launching the missile, which flew a fully guided 550-mile flight using the GPS and digital scene matching area correlation navigation updates. Eight flight tests from both surface ships and attack submarines demonstrated all system capabilities. Current plans call for the Navy to procure more than 3,000 TACTOM missiles. TLAM Block III BGM-109 and UGM-109 missiles are still deployed in the Fleet. Block III TLAM Missiles undergo periodic recertification and maintenance to assure their continued viability.

Status

LRIP I, II, and III are complete. Raytheon Missile Systems began missile deliveries in May 2004 and is currently delivering FRP 1 missiles. The full-rate production contract signed on 18 August 2004 was the Navy's first multi-year contract for weapons procurement and will procure approximately 2,000 missiles. Future procurement plans will add an additional 1,000 missiles to the inventory. Tactical Tomahawk made its first significant deployment in May 2005 in USS *Higgins* (DDG 76). Tactical Tomahawk is now an integral part of defense capability with more than 500 missiles in the fleet.

Developers

Raytheon Missile Systems; Tucson, Arizona

Extended-Range Munition (ERM)

Description
The ERM is a rocket-assisted projectile capable of carrying a Unitary blast-fragment warhead with an associated height-of-burst fuse. The 100 pound-plus aerodynamic projectile is five inches in diameter and 61 inches in length and uses a coupled Global Positioning System/Inertial Navigation System (GPS/INS) guidance system. The guidance system is resistant to jamming, enabling the ERM to attack targets in an electronic countermeasures environment. Its long range and accurate GPS targeting capability will improve Naval Surface Fire Support (NSFS) and provide gunfire support for expeditionary operations, suppression, and destruction of hostile anti-shipping weapons and air defense systems in support of the joint land battle.

Status
Milestone I/II was reached in July 1996, allowing the ERM to enter EDD. Developmental work continues as the program overcomes technical challenges. Work also continues on increasing reliability, designing the highly accurate guidance system that can withstand the harsh environment encountered during a gun firing, and other areas to provide cost-effective, accurate, and lethal munitions that meet NSFS requirements.

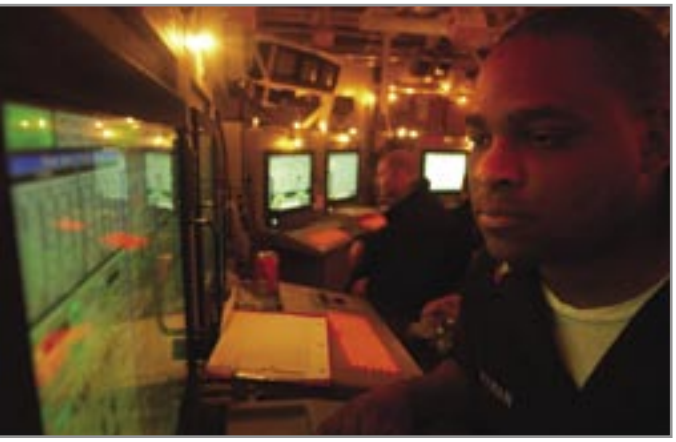
Developers
To be determined.

MK-45 Mod 4 Five-Inch/62-Caliber Gun System Upgrade

Description
The MK-45 Mod 4 5-inch 62 Gun will significantly enhance Naval Surface Fire Support (NSFS) capabilities, significantly improve maintenance procedures, and provide fire mission flexibility for anti-surface and anti-air warfare. The 5-inch (127mm)/62-caliber MK-45 Mod 4 Gun incorporates structural improvements to accommodate higher energies required to fire Extended-Range Munitions (ERM) and the current inventory of conventional 5-inch ballistic ammunition. Modifications include a longer (62-caliber) barrel, an Ammunition Recognition System, a Gun/ERM interface and a digital control system. Modifications to the ammunition magazine for the MK-45 Mod 4 Gun have also been developed to facilitate stowage of the larger ERM rounds and assist shipboard ammunition handling personnel with handling and loading the heavier rounds. The MK-45 Mod 4 Gun is currently being forward-fit in *Arleigh Burke* (DDG 51)-class Aegis destroyers (DDGs 81-112).

Status
Milestone I/II was reached in January 1996, allowing the MK-45 Mod 4 Gun to enter EMD. The Navy awarded the MK-45 Mod 4 Gun design and development contract on 5 February 1996. The first gun was successfully tested in July 1997 at the Naval Surface Warfare Center, Dahlgren, Virginia. All critical exit criteria associated with land-based testing were met allowing for LRIP approval on 12 April 1999. The gun completed testing with conventional rounds in 2003 and was approved to fire conventional ammunition per 24 April 2004 Milestone C decision. The gun will be evaluated for ERM functionality in parallel with the ERM test schedule. There are currently 21 DDG 51 destroyers equipped with the MK-45 Mod 4 Gun.

Developers
BAE Systems; Minneapolis, Minnesota



Naval Fires Control System (NFCS)

Description
Over the last ten years, ground forces have moved to communication with digital devices, including the fire support community. NFCS allows surface ships to communicate with the ground force's primary fire support command and control network, the Advanced Field Artillery Tactical Data System (AFATDS). NFCS is interoperable with joint C4ISR systems, providing the mission-planning and fire-support coordination functions required to support expanded mission capability afforded by the extended range and precision accuracy of the improved MK-45Mod 4 (5-inch/62-caliber) gun, Extended Range Munition (ERM),and the Advanced Gun System (AGS).

Status
Milestone III was reached on 6 December 2004 which authorized full-rate production of NFCS with a limited fleet introduction. The system achieved IOC 5 July 2005 and currently 21 systems are installed. Program development and procurement is on track for installation on DDGs 81-112. A total of 32 systems are planned for fielding FY 2005-2011.

Developers
Naval Surface Warfare Center; Dahlgren; Dahlgren, Virginia
Space and Naval Warfare Systems Center; San Diego, California
Naval Undersea Warfare Center; Keyport; Keyport, Washington
General Dynamics Information Systems; Arlington, Virginia

Other Developer
GEC-Marconi Electronics Systems; Wayne, New Jersey

Tactical Tomahawk Weapon Control System (TTWCS)

Description
TTWCS is the next significant upgrade to the current Advanced Tomahawk Weapon Control System (ATWCS). TTWCS initializes, prepares and launches Block III and Block IV Tomahawk Land Attack missiles. TTWCS also introduces the ability for firing units to plan Block III and Block IV GPS-only missions, retarget Block IV missiles to alternate pre-planned targets, and monitor missiles in-flight. The upgraded system reduces the number of equipment racks required aboard surface ships, introduces common software for the various Tomahawk capable platforms (DDG, CG, SSN, SSGN, and U.K. SSN) and reduces overall reaction and engagement planning timelines. TTWCS also improves operator interaction with the system and provides an integrated training capability at all levels. Furthermore, TTWCS builds upon the ATWCS system architecture to maintain existing Tomahawk Weapon System (TWS) Baseline III functionality, provides for future growth, and enhances command-and-control interoperability.

Status
The TTWCS Block III weapon control system capability reached IOC in 2003. Full Block IV IOC occurred in 2004 with the introduction of the Tactical Tomahawk Block IV missile. The USS *Stetham* (DDG 63) launched a Block III and several Block IV Tomahawk missiles using the new TTWCS Version 4, successfully testing Launch Platform Mission Planning (LPMP) and other Baseline IV TWS capabilities. TTWCS Version 5 continues to enhance the TTWCS capabilities with a scheduled IOC in third quarter 2007. SSGNs will also be outfitted with TTWCS scheduled IOC in 2007. TTWCS functionality is also currently planned for installation on the DDG 1000 combatant.

Developers
Naval Surface Warfare Center, Dahlgren; Dahlgren, Virginia
Lockheed Martin; Valley Forge, Pennsylvania
Naval Undersea Warfare Center, Keyport; Keyport, Washington
Southeastern Computers Consultants Inc.; Austin, Texas
Naval Undersea Warfare Center; Newport, Rhode Island

SEA SHIELD

PLATFORMS

Aircraft

Broad Area Maritime Surveillance (BAMS) Unmanned Aircraft System (UAS)

Description
BAMS UAS is integral in recapitalizing the Navy's airborne ISR force. BAMS UAS will provide a persistent maritime ISR capability that will play a significant role in the Sea Shield and FORCENet pillars of *Sea Power 21*. In its Sea Shield role, BAMS UASs on-station persistence enables unmatched awareness of the maritime battlespace by sustaining the maritime Common Operational Picture for Surface Warfare and the Global War on Terrorism. The system will serve as a Fleet Response Plan enabler while acting as a trip wire for surge forces. In its FORCENet role, it will support decision superiority precision and mobility while providing IP-based wideband transponder services that net the battlespace.

BAMS UAS is an endurance-class UAS that will operate from land-based sites around the world. Sites most likely will be located at current P-3 aircraft, or its planned successor, MMA, operating sites. Because BAMS UAS and the MMA/P-3 have related, complementary missions, co-location enhances manpower, training, and maintenance efficiencies. Systems of up to 5-6 air vehicles at each operating location provide persistence by being airborne 24 hours a day, 7 days a week out to on-station ranges of 2,000 nautical miles. Worldwide access is achieved by providing coverage over high-density sea-lanes, littorals, and areas of national interest from its operating locations.

Status
The BAMS UAS analysis of alternatives, operational requirements document, and initial CONOPS is complete. Milestone B is scheduled for fourth quarter FY 2007 and IOC is scheduled for FY 2014.

Developers
To be determined.

MH-60R/S Seahawk Multi-Mission Combat Helicopters

Description
The MH-60R and MH-60S multi-mission combat helicopters are the two pillars of the CNO's Naval Helicopter Concept of Operations (CONOPS) for the 21st Century. Under the Helicopter CONOPS, the Seahawk will deploy as companion squadrons embarked in the Navy's aircraft carriers, surface warships, and logistics ships. The MH-60R will provide surface and undersea warfare support to Sea Shield operations with a suite of sensors and weapons that include low frequency (dipping) sonar, electronic support measures, advanced Forward Looking Infrared, and precision air-to-surface missiles. The MH-60S will provide mine warfare support for Sea Shield and will partner with the MH-60R for surface warfare missions carrying the same Forward Looking Infrared air-to-ground sensors and weapons. The MH-60S will be reconfigurable to provide Combat Search and Rescue

and Naval Special Warfare support to joint theater operations. Airborne mine countermeasures operations will be accomplished using advanced sensor and weapons packages to provide detection, localization, and neutralization to anti-access threats. The MH-60S will anchor the fleet logistics role in carrier strike group and expeditionary strike group operations. MH-60R/S platforms are produced with 85 percent common components (e.g., common cockpit and dynamic components) to simplify maintenance, logistics, and training.

Status
The MH-60R completed its OPEVAL in third quarter FY 2005. It was authorized to enter full-rate production in March 2006. The Navy plans to acquire 254 MH-60Rs. The MH-60S was approved for full-rate production in August 2002 and is currently undergoing scheduled block upgrades for combat and airborne mine counter-measure missions. The Navy plans to acquire 271 MH-60Ss.

Developers
Lockheed Martin; Owego, New York
Sikorsky; Stratford, Connecticut

MQ-8B Fire Scout Vertical Takeoff and Landing Tactical UAV (VTUAV)

Description
Fire Scout VTUAV will provide multi-mission tactical UAS support to the Littoral Combat Ship (LCS). Fire Scout will support LCS core mission areas of Mine Interdiction Warfare (MIW), Antisubmarine Warfare (ASW), and Surface Warfare (SUW) with modular payloads as well as organic ISR, targeting, and communication-relay functions. The Fire Scout will employ the Tactical Control System (TCS) and the Tactical Common Data Link (TCDL) as the primary means for UAS command and control and sensor payload dissemination. Fire Scout is a critical component of LCS off-board sensors.

Status
Fire Scout is currently in Engineering, Manufacturing, and Development (EMD) with developmental testing ongoing. Fire Scout is scheduled for IOC in FY 2008. Fire Scout has also been selected by the U.S. Army for its Future Combat Systems (FCS) Class IV Unmanned Aircraft System.

Developers
Northrop Grumman; San Diego, California
Schweizer Aircraft Corporation; Big Flats, New York

P-3C Orion Modification, Improvement, and Sustainment

Description

The P-3C Orion provides effective undersea warfare, anti-surface warfare, and Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) capabilities to naval and joint commanders, including support for carrier strike groups and expeditionary strike groups. The current force is 12 active and three reserve squadrons. There are also three Reserve Fleet Response Units (FRUs) co-located with the active squadrons at Jacksonville, Florida; Brunswick, Maine, and Whidbey Island, Washington. The FRUs operate current Fleet equipment and are trained to provide augmenting crews to the active force. The Navy's P-3 roadmap focuses on three areas: Inventory sustainment, modernization, and re-capitalization by the Multi-Mission Maritime Aircraft (MMA) to provide a force optimized for regional and littoral crisis and conflict.

Specific program elements include:

Inventory Sustainment: A service life assessment program has been completed to determine what actions must be taken to safely extend the airframe service life. A program of Special Structural Inspections (SSIs), which will allow extension of P-3 service life, started in FY 2003. More comprehensive inspections and preemptive repairs are being performed under the Enhanced Special Structural Inspection (ESSI) program that started in FY 2004. The Special Structural Inspection-Kit (SSI-K) program that began in FY 2005 is similar to ESSI but has expanded scope and includes use of new design/materials to increase fail-safe margins. These programs will allow sustainment of the P-3 fleet until the MMA starts replacing the P-3 in 2013.

Modernization: The Anti-Aircraft Improvement Program (AIP) provides enhanced sensor, C4ISR, and weapon capabilities. The program includes the incorporation of improved C4I systems, an advanced imaging radar, an infrared/electro-optic sensor, an improved Electronic Support Measures (ESM) system, improved weapons capability, and enhanced survivability measures. AIP aircraft will be equipped with the USQ-78B acoustic processor for improved littoral ASW effectiveness.

The P-3C Update III Block Modification Upgrade Program (BMUP) converts P-3C Update II and II.5 aircraft to the Update III system architecture. BMUP aircraft are also equipped with the USQ-78B.

Status

As of FY 2007, 77 SSIs are complete and 28 ESSIs are complete. Sixty-nine of 72 funded AIP aircraft have been delivered (one has been struck). Twenty-five BMUP aircraft have been delivered. Five

SSI-Ks are in production.

Developers
Lockheed Martin; Marietta, Georgia; Eagan, Minnesota; Greenville, South Carolina; Manassas, Virginia
L3Com; Greenville, Texas

P-8A Multi-mission Maritime Aircraft (MMA)

Description
The P-8A will replace the P-3C Orion aircraft, which has reached the end of its service life. The P-8A will feature a technologically agile, open architecture that enables integration of modern, capable sensors with robust communications. P-8A will tailor integration of its onboard mission suite with unmanned aerial vehicles and satellite-based systems and sensors to assure maritime access in support of the Sea Shield pillar of *Sea Power 21*. MMA will provide unparalleled persistent undersea warfare capability as well as significant anti-surface warfare and intelligence, surveillance, and reconnaissance (ISR) capability. MMA will leverage global logistics support infrastructure and established advanced training applications to provide both higher availability and improved warfighting readiness. Finally, MMA will implement a new Human Total Force Strategy that uses contractors to perform most of the maintenance functions presently performed by Sailors, thereby lowering operating and support costs below that of the legacy platform.

Status
The MMA program received a Milestone 0 decision in March 2000 and explored concepts for MMA with industry. Included in the concepts was the integration of UAVs to augment MMA capability. AoA began in summer 2000 and leveraged previous analyses and the results of the industry studies. This analysis concluded that manned aircraft are an essential element of providing broad area maritime and littoral armed ISR, and that UAVs provided a transformational opportunity for obtaining additional capability for warfighters. In 2002, the Navy re-engaged industry in Component Advanced Development, refining concepts, matching architecture to fill the Navy vision and validating requirements. USD (AT&L) approved a revised acquisition strategy to focus MMA on P-3 replacement, not a P-3 Service Life Extension. MMA reached Milestone B in May 2004 and the Navy selected the McDonnell-Douglas Corporation, a wholly owned Subsidary of the Boeing Company, as the single system integrator in June 2004. The P-8A program completed a successful Preliminary Design Review in November 2005 and is currently working toward Critical Design Review planned for early 2007.

Developers
The Boeing Company; Renton, Washington

S-3B Viking Sustainment Program

Description
The S-3B Viking provides multi-mission support to battle group and joint commanders as the carrier strike group's primary anti-surface warfare platform. In addition, it provides electronic surveillance and overland strike support and will remain the sole organic aerial refueling asset until the full integration of the F-18E/F Super Hornet. On 25 May 2006 NAVAIR delivered the first LANTIRN/ROVER Data Transmission System equipped S-3B to CVW-1. Total time to develop, test and deliver the aircraft took approximately ten weeks. Most of the major components came from existing NAVICP inventories. The S-3B will be utilized in a non-traditional ISR role providing a third generation FLIR capability and a means to transmit real time imagery to troops on the ground. LANTIRN development of follow-on aircraft will support the remaining S-3B deployments.

Status
The S-3B Viking community was selected for retirement in October 2002, which will be coordinated with the fielding of the F/A-18E/F Super Hornet tanker capable aircraft through FY 2009. All current avionics/navigation/computer upgrade programs required to safely sustain the aircraft through its projected retirement schedule have been completed.

Developers
Lockheed Martin; Fort Worth, Texas

Submarines

SSGN Nuclear-Powered Guided-Missile Submarine

Description
The first four of the *Ohio* (SSBN 726)-class Trident fleet ballistic missile submarines (SSBNs) are being converted to nuclear-powered guided missile and special-operations submarines (SSGNs). The SSGN configuration will be able to carry up to 154 Tomahawk (TLAM/TACTOM) land-attack missiles to conduct covert, large-volume, precision strikes. With unparalleled on station persistence and unrivaled access, the SSGN will prepare the knowledge battlespace for follow-on forces using a variety of on-board and off-board sensors such as Unmanned Underwater Vehicles (UUV) and one of the most advanced sonar and fire control systems ever fielded on a submarine. The *Ohio*-class SSGN will also have the capability to support a Special Operations Force (SOF) contingent of up to 66 personnel for an extended period of time, providing clandestine insertion and retrieval via converted missile tubes used as lockout chambers, dry deck shelters, or the Advanced SEAL Delivery System (ASDS). Operating with two crews and using the existing Trident infrastructure, this potent warfighter is designed

to have a 70 percent in-theater presence. With the large payload capability of an SSBN and the flexibility of having 22 seven-foot diameter reconfigurable converted missile tubes, these transformational submarines will have the ability to leverage future payloads and sensors, including potential use a platform for ballistic missile defense. All of this combines to make the SSGN the platform of choice for a wide variety of missions both now and into the foreseeable future.

Status

The first two ships, the USS *Ohio* (SSBN 726) and USS *Florida* (SSBN 728), began their refueling and conversion overhauls in FY 2003. The USS *Michigan* (SSBN 727) and USS *Georgia* (SSBN 729) began their refueling and conversion overhauls in FY 2004 and FY 2005, respectively. The USS *Ohio* delivered to the Navy at the end of 2005 and USS *Florida* delivered to the Navy in the spring of 2006. USS *Michigan* delivered to the Navy in November 2006. The first SSGN will be deployment ready in FY 2007. The anticipated cost for all four SSGN conversions is approximately $4 billion.

Developers

General Dynamics Electric Boat; Groton, Connecticut

SSN 774 *Virginia*-Class Nuclear-Powered Attack Submarine

Description

The transformational USS *Virginia* (SSN 774)-class submarine provides advanced acoustic technology and performs traditional open-ocean anti-submarine and anti-surface missions, yet is specifically designed for multi-mission littoral and regional operations. These advanced submarines are fully configured to conduct mining and mine reconnaissance, Special Operations Forces (SOF) insertion/extraction, battle group support, intelligence-collection and surveillance missions, sea-control, and land attack. Furthermore, the *Virginia* SSNs is specifically configured to adapt easily to special missions and emerging requirements. The 30-ship SSN 774 program is the first major program to fully implement acquisition reform initiatives. The tenets of the *Virginia*-class affordability are Integrated Product and Process Development (IPPD), modular construction, parts reduction, and aggressive insertion of advanced COTS technologies and an open-architecture computing environment. The IPPD concept teams the Navy, shipbuilders, designers, and vendors to assure the most efficient and effective design early in the design process. Modular construction allows construction, assembly, and testing of systems prior to installation in the ship's hull, thereby reducing costs, minimizing rework, and simplifying system integration. The ship's modular design

will also facilitate technology insertion in both new-construction future ships and back-fit into existing ships, throughout their 30-year service lives.

Status

The ships are being built under an innovative teaming arrangement between General Dynamics Electric Boat (EB) and Northrop Grumman Newport News (NGNN). EB will assemble and deliver the first, third, and fifth ships; NGNN, the second, fourth, and sixth. Construction of the USS *Virginia* (SSN 774) began in FY1998, and the ship was commissioned in October 2004. The *Virginia* conducted her first operational mission in 2005, prior to her Post Shakedown Availability dry-docking, an unprecedented achievement. *Virginia's* ability to successfully complete this early deployment is a testament to the excellent design and construction effort put forth by both EB and NGNN. USS *Texas* (SSN 775) began construction in FY 1999 and was commissioned in September 2006. USS *Hawaii* (SSN 776) began construction in FY 2001. USS *North Carolina* (SSN 777) began construction in FY 2002. USS *New Hampshire* (SSN 778) began construction in FY 2003. USS *New Mexico* (SSN 779) began construction in FY 2004 and SSN 780, SSN 781, and SSN 782 began construction in FY 2005, FY 2006, and FY 2007, respectively. *Virginia*-class acquisition continues throughout the FYDP. The FY 2007 request included funds for the fourth of five submarines ordered under an innovative multi-year procurement contract that resulted in a cost savings of approximately $80 million per hull or $400 million throughout the course of the contract.

Developers

General Dynamics Electric Boat Corporation;
Groton, Connecticut
Northrop Grumman; Newport News, Virginia

Surface and Expeditionary Warfare Ships and Craft

CG 47 *Ticonderoga*-Class Aegis Guided-Missile Cruiser Modernization

Description

The 22 *Ticonderoga* (CG 47)-class guided missile cruisers have a combat system centered on the Aegis Weapon System and the SPY-1 A/B multi-function, phased-array radar. *Ticonderoga*-class cruisers provide multi-mission offensive and defensive capabilities, and operate independently or as part of carrier strike groups, expeditionary strike groups, and surface action groups in support of global operations. The *Ticonderoga*-class combat system includes the Standard Missile (SM-2), unparalleled land-attack systems, advanced anti-submarine and anti-surface warfare systems,

embarked sea-control helicopters, and robust command-control-and-communications systems in a potent, multi-mission warship. In addition, these cruisers are equipped with the MK-41 Vertical Launching System (VLS), giving them a significant surface fire capability with the Tomahawk Land-Attack cruise Missile (TLAM) and, in the future, the Tactical Tomahawk (TACTOM).

Status
The 22 VLS-capable Aegis cruisers are planned for Cruiser Modernization beginning in FY 2008, and will receive upgrades in air dominance (cooperative engagement capability, SPY radar upgrades), maritime force protection (CIWS 1B, ESSM, Nulka, SPQ 9B), undersea warfare (SQQ 89A(V)15) and mission life extension (SmartShip, all-electric auxiliaries, weight, and moment). The cruisers are viable candidates for a ballistic missile defense role. The Cruiser Modernization warfighting improvements will extend the Aegis combat system's capabilities against projected threats well into the 21st Century and, with the DDG 51 destroyers, serve as the bridge to the surface combatant family of ships: DDG 1000, LCS, and CG(X).

Developers
General Dynamics Bath Iron Works; Bath, Maine
Northrop Grumman Ship Systems; Pascagoula, Mississippi
Lockheed Martin; Moorestown, New Jersey

CG(X) 21st Century Cruiser

Description
The Next-Generation Guided Missile Cruiser, CG(X), is envisioned as a highly capable surface combatant tailored for Air and Missile Defense and Joint Air Control Operations. CG(X) will provide maritime dominance, independent command and control, forward presence and operate as an integral component of joint and combined forces. The CG(X) design and development program features evolutionary acquisition and spiral development practices to incorporate advanced technologies and next generation engineering systems. CG(X) will also replace the *Ticonderoga* (CG 47)-class ship at the end of its 35 year service life. Current Navy campaign and joint missile defense analysis has demonstrated a critical mission need for CG(X) late next decade.

Status
The JROC validated the Maritime Air and Missile Defense of the Joint Forces Initial Capabilities Documenting 2006. The Navy was designated as the lead service for Concept Refinement Phase of acquisition and is leading the AoA to determine CG(X)'s best mix of capabilities and tradeoffs between hull form, interceptors, air and missile defense systems, sensors, other combat systems, employment and costs.

Developers
To be determined.

DDG 51 *Arleigh Burke*-Class Aegis Guided-Missile Destroyer Modernization

Description
The *Arleigh Burke* (DDG 51)-class guided missile destroyers will undergo a mid-life modernization commencing in FY 2010 with DDG 51. The program will be accomplished in two phases. The first phase will concentrate on the Hull, Mechanical, and Electrical systems to include new Giga Bit Ethernet connectivity in the engineering plant, a Digital Video Surveillance System, along with the Integrated Bridge, an Advanced Galley and other habitability and manpower reduction modifications. A complete Open Architecture computing environment will be the foundation for war fighting improvements in the second phase for each ship. The upgrade plan consists of an improved Multi-Mission Signal processor to accommodate Ballistic Missile Defense capability and an improvement to radar performance in the littoral regions. IABM and NIFC-CA bring joint capability to the war fighter resident in the new superset computer program. Additionally, Cooperative Engagement Capability (CEC), Evolved Sea Sparrow Missile (ESSM), CIWS Blk 1B, SEWIP, and NULKA. The *Burke*-class MK-41 Vertical Launching System (VLS) will be upgraded to support SM-3 and newer variants of the SM missile family. DDG 51 destroyers will continue to provide multi-mission offensive and defensive capabilities with the added benefit of Sea-based protection from the ballistic missile threat. These two phases will be accomplished on each ship approximately two years apart. Together with the Cruiser Modernization program, these highly capable warships will be the bridge to the next-generation surface combatant family of ships: DDG 1000, LCS, and CG(X).

Status
The Hull, Mechanical, and Electrical modifications are being designed in the last two new construction *Arleigh Burke*-class destroyers (DDGs 111-112). This design in new construction maximizes risk reduction and proofs these alterations in the builder's yards. The authorization and appropriation for the last three DDGs, to complete a ship class of 62, was completed in 2005. DDG Modernization concentrates initially on the Flight I and II ships (hulls 51-78). However, this program is a modernization program for the entire 62 ship class.

Developers
General Dynamics Bath Iron Works; Bath, Maine
Northrop Grumman Ship Systems; Pascagoula, Mississippi
Lockheed Martin; Moorestown, New Jersey

DDG 1000 21st Century Destroyer

Description

The DDG 1000 is the Navy's future multi-mission destroyer, designed to provide precision strike and sustained volume fires to support Joint forces inland and conduct independent attacks against land targets. DDG 1000 will be armed with the Advanced Gun System (AGS), which fires precision-guided Long-Range Land-Attack Projectiles (LRLAP) up to 83 nautical miles. For longer-range strike missions, DDG 1000 will carry Tactical Tomahawks (TACTOM) housed in a damage-tolerant Peripheral Vertical Launch System (PVLS) lining the ship's hull. With state-of-the-art network-centric information technologies, DDG 1000 will operate seamlessly with naval, ground, and land-based forces. The DDG 1000 program's emphasis on "sensor-to-shooter" connectivity will provide a naval or Joint Task Force commander with the multi-mission flexibility to engage a wide variety of land targets while simultaneously defeating maritime threats. DDG 1000 capabilities in undersea, surface, and air warfare are designed for enhanced performance in the littoral environment, providing defense of other ships in the expeditionary strike group or carrier strike group. DDG 1000 will have a flight deck that can support unmanned aerial vehicles as well as helicopters and the new MV-22 tilt rotor aircraft. DDG 1000 will utilize multi-spectral signature reduction to render it significantly less detectable to potential adversaries and more survivable than our legacy fleet. DDG 1000 will feature an Integrated Power System (IPS) to provide power for advanced propulsion systems as well as high-powered combat systems and ship service loads. An open-architecture distributed combat system will support a "plug-and-fight" environment. Current elements of the DDG 1000 combat system include the modular and highly survivable PVLS, the AGS and the Dual Band Radar (DBR) suite, composed of the Multi-Function and Volume Search Radars. Other DDG 1000 features include an advanced hull form, optimal manning based on comprehensive human-systems integration and human-factors engineering studies, extensive automation, advanced apertures, and dramatic reductions across the entire spectrum of signatures (radar, acoustic, magnetic, and infrared). DDG 1000 will use a "spiral-design" review process, ensuring that each of these breakthrough technologies responds to future operational requirements. Once validated aboard DDG 1000, appropriate technologies will be incorporated into other members of the family of surface combatants, including the next-generation cruiser as well as future carriers and amphibious ships.

Status

The DDG 1000 program successfully completed ten Engineering Development Models for new technologies and is ready to transition this technology into production. Recent Congressional support of the Navy's Dual Lead Ship acquisition strategy is allowing competing shipyards to build the two lead ships simultaneously.

The Navy expects to award construction contracts in early 2007. Currently the ship is in Detailed Design and the lead ships will deliver in 2012.

Developers
Northrop Grumman Ship Systems (NGSS); Pascagoula, Mississippi
General Dynamics Bath Iron Works; Bath, Maine
Raytheon Systems, Inc; Sudbury, Massachusetts
BAE Systems; Minneapolis, Minnesota
More than 80 companies nationwide, including Lockheed Martin, involved with DDG 1000.

FFG 7 *Oliver Hazard Perry*-Class Guided-Missile Frigate Modernization

Description
The *Oliver Hazard Perry* (FFG 7)-class guided-missile frigates are capable of operating as an integral part of a carrier strike group or surface action group. They are primarily used today to conduct maritime interception operations, presence missions and counter-drug operations. A total of 55 *Perry*-class ships were built—51 for the U.S. Navy and four for the Royal Australian Navy. Of the 51 ships built for the United States, 21 remain in active commissioned service and nine are in the Navy Reserve Force. The FFG modernization improvements will assist the class in reaching its 30-year expected service life.

Status
The 30-ship FFG class is undergoing a modernization package that commenced in FY 2003 with USS *Kauffman* (FFG 59). It corrects the most significant maintenance and obsolescence issues in order to maintain the ships through their full 30-year service lives. The FFG 7 modernization package includes replacement of four obsolete Ship Service Diesel Generators with COTS SSDGs; obsolete evaporators with COTS Reverse Osmosis (RO) units; and existing track way boat davit with COTS Slewing Arm Davit (SLAD). Other major HM&E alterations remaining include ventilation modifications and AMR #3 fire-fighting sprinkler modifications. The modernization effort's scheduled for completion by 2011.

Developers
General Dynamics Bath Iron Works; Bath; Maine

Littoral Combat Ship (LCS)

Description

Future joint and combined operations will hinge on our ability to provide access in the face of an unpredictable and asymmetrical threat. This has been recognized for some time; however, the events of the last few years, including the Global War on Terrorism, have brought a renewed sense of urgency to these missions. The anti-access threats challenging our naval forces in the littorals include quiet diesel submarines, mines, and small highly maneuverable surface attack craft. Such threats have great potential to be effectively employed by many less-capable countries and non state actors to prevent U.S. forces from unhindered use of littoral areas. LCS, as one element of the future surface combatant family of ships, will be optimized to defeat these anti-access threats in the littoral. It will use open-systems architecture design, modular weapons and sensor systems, and a variety of manned and unmanned vehicles to expand the battle space and project offensive power into the littoral. Technology has matured to the point where we can employ significant warfighting capability from a small, focused-mission warship like the LCS in support of Sea Strike and Sea Shield operations. Focused-mission LCS mission packages are being developed that will provide capabilities critical to Sea Shield's forcible entry, sea/littoral superiority, and homeland defense missions. The ship will also possess inherent capabilities to conduct missions supporting ISR, special operations, and maritime interception and homeland defense, regardless of mission package installed. Fully self-deployable and capable of sustained underway operations from homeports to any part of the world, the LCS will have the speed, endurance, and underway replenishment capabilities to transit and operate independently or with carrier strike or expeditionary strike groups.

Status

LCS will capitalize on emerging unmanned vehicle, sensor and weapons technologies and will deliver the focused Sea Shield missions of Mine Warfare, Surface Warfare, and Anti-Submarine Warfare. Initial program included four Flight 0 ships through FY 2007 Flight 0 will include all ships through FY 2009. In May 2004, Navy awarded two contracts options to Lockheed Martin and General Dynamics to build four LCS ships (2 of each design). USS Freedom (LCS 1), the first Lockheed Martin ship, is under construction in Marinette Marine (WI) with expected completion late 2007. USS Independence (LCS 2), the first General Dynamics ship, is under construction at Austal in Mobile, Alabama with an expected completion in early 2008. The Mine Warfare mission package will deliver in FY 2007 with Anti-submarine Warfare and Surface Warfare packages delivering in FY 2008.

Developers

Flight 0 teams led by General Dynamics and Lockheed Martin

MCM-1 *Avenger*-Class Mine Countermeasures Ship Modernization

Description
The *Avenger* (MCM-1)-class mine countermeasures ships are primarily used to detect, classify, neutralize, and sweep mines in sea lines of communication and operating areas. These ships are one part of the mine countermeasures triad. A total of 14 *Avenger*-class ships were built. Of the 14 ships built, nine remain in active service, and five are in the Navy Reserve Fleet pending return to active service by the end of FY 2009. The MCM modernization improvements will assist the class in reaching its 30-year expected service life.

Status
The 14-ship MCM class is undergoing a modernization package that commenced in FY 2004. It corrects the most significant maintenance and obsolescence issues in order to maintain the ships through their full 30-year service lives. The MCM-1 modernization package includes Planned Product Improvement Program (PPIP) on the Isotta Fraschini main engines and generators for MCM-3 through MCM-14; replacement of the obsolete Mine Neutralization Vehicle with Expendable Mine Neutralization System (EMNS); and upgrading the existing SQQ-32 Sonar with High Frequency Wide Band capabilities. Other major HM&E alterations include 400-Hz modifications, replacement of Aft Deck hydraulic equipment with electric equipment, replacement of the diesel generator analog voltage regulators with digital voltage regulators, and upgrading the common navigation system. The modernization effort is scheduled for completion by 2010.

Developers
USN FDGM; Ingleside, Texas
USN Raytheon; Portsmouth, Rhode Island

Equipment and Material

Chemical, Biological, Radiological and Nuclear Defense - Individual Protection Equipment - Readiness Improvement Program (CBRND - IPE - RIP)

Description
The Individual Protective Equipment (IPE) Readiness Improvement Program (RIP) for the Forces Afloat manages millions of individual pieces of equipment for Sailors deploying into potential CBR threat environments. Through a centralized management approach, this program ensures Sailors are always provided with correctly maintained and properly fitted individual protection ensembles and a chemical protective mask; ready for

immediate retrieval in response to the dictated Mission Oriented Protective Posture (MOPP) condition. Historically, the maintenance and logistics functions required to maintain the material readiness of this equipment required an extraordinary amount of organizational unit man hours that were better used supporting operational and training functions. The cornerstone of the RIP is the NAVSEA Consolidated Storage Facility (CSF) located at Ft. Worth, Texas. This NAVSEA managed facility executes the following key services:

• The inspection for serviceability of chemical protective equipment and mask

• Cleaning and sanitizing protective mask

• Testing of mask utilizing a mask leakage tester

• Laser etching protective masks with a bar-code serial number

• Assembly and disassembly of equipment

• Bar-coding of other IPE equipment/support equipment

• Packaging items for shipment

• Assembly of personalized and generic IPE kits

• Inventory management (bar-code warehouse management system)

• Shelf-life surveillance and maintenance

• Asset visibility for the annual reports to Congress.

Status

Over the past three years since the inception of the RIP program, more than 94,000 Sailors (approximately 75 percent of the Afloat Forces) have been processed through this program. Each of these Sailors were issued a personally sized and properly fitted Joint Service Lightweight Suit Technology (JSLIST) ensemble and a chemical protective mask. In addition to the IPE and gas masks, the Readiness Improvement Program currently provides support in other areas such as:

• Managing Interceptor Body Armor (IBA), Dorsal Auxiliary Protective Systems (DAPS) and Light Weight Helmets (LWH's) for the Expeditionary Forces

• Providing CBRND IPE and IBA to the Navy's Individual Augmentee's as they process through designated Army training centers and the management of CBRND IPE

• Managing Anti-Terrorism/Force Protection (AT/FP) equipment for the Military Sealift Command (MSC).

Developers
Naval Surface Warefare Center Panama City; Panama City, Florida
Battelle Memorial Institute; Columbus, Ohio
Gryphon Technologies; Riverdale, Maryland
General Dynamics Information Technology; Fairfax, Virginia

Shipboard Collective Protection System (CPS)

Description
CPS provides a protective environment from chemical, biological, and radiological (CBR) threats, where personnel can perform their mission-essential operations without the use of individual protective equipment. The system over-pressurizes specified ship spaces with air filtered through an array of housings, which contain multiple 200 cubic feet per minute CBR filter sets preventing the ingress of CBR contaminants. Zone ingress and egress through a variety of supporting systems including air locks, pressure locks, and decontamination stations located on the zone boundaries maintain the integrity of clean spaces. Integrated into the heating ventilation and air conditioning (HVAC) systems, shipboard CPS provides continuous protection to those personnel operating within the zone boundary. When it is not feasible to provide protection to the entire ship, mission-essential spaces such as medical spaces, command and control, and rest and relief areas are outfitted with CPS.

Status
Shipboard CPS is installed on more than 70 ships. CPS coverage varies by ship class and ranges from the entire ship interior (DDG 51 FLTI, DDG 51 FLTII, and AOE/T-AOE-6 class) to zone-specific coverage systems (DDG 51 FLTIIA, LSD, LPD 17, LHD, LHA, and LCS). These systems are a combination of new construction and back-fit installations, having unique requirements and support needs. Currently, it is projected that 127 ships will have CPS by FY 2013, increasing the total number of ships presently outfitted by over 75 percent.

Developers
Naval Surface Warfare Center; Dahlgren, Virginia

WEAPONS

Airborne

Airborne Mine Neutralization System (AMNS)

Description
The AMNS is an expendable, remotely operated mine neutralization device that leverages non-developmental integration and COTS Technologies, deploys from MH-60S helicopters, and provides identification and neutralization of proud (i.e., not buried), close-tethered, and in-volume naval mines. The MH-60S will deploy a remotely operated AMNS neutralization device to a previously detected mine location where it will reacquire and neutralize identified targets. The AMNS will be fully integrated into the MH-60S avionics architecture.

Status
Beginning in FY 2003, AMNS systems have been procured for the MH-53E to provide a near-term contingency airborne neutralization capability. Follow-on AMNS system integration into the MH-60S began in FY 2003 and will continue through a FY 2007 Milestone C decision. The AMNS on the MH-60S is scheduled for IOC in FY 2007.

Developers
Lockheed Martin; Syracuse, New York
STN Atlas; Germany
Raytheon; Portsmouth, Rhode Island

Rapid Airborne Mine Clearance System (RAMICS)

Description
The RAMICS will fire a MK-258 Mod1 30mm super-cavitating projectile from a MK-44 Bushmaster II gun to neutralize surface and near-surface mines. The RAMICS will ultimately be hosted onboard the MH-60S helicopter as one of five developing Airborne MCM (AMCM) systems organic to the strike group. At the heart of this system is a super-cavitating Tungsten projectile that is specially designed for traveling tactical distances in air and water and through a casing, causing a low-order deflagration of the mine. The gun is controlled by a fire-control system with targeting algorithms coupled with a Light Detection and Ranging (LIDAR) system. The LIDAR locates and targets the mines and provides aiming coordinates to the gun's fire control system to fire a burst of rounds at the mine, causing immediate and positive mine neutralization.

Status
The RAMICS program was re-baselined in FY 2006. Procurement of systems begins in FY 2009 with first installments in FY 2010. RAMICS IOC is scheduled for FY 2010.

Developers
Northrop Grumman; Melbourne, Florida

Subsurface, Surface, and Expeditionary

Assault Breaching System (ABS)

Description
The ABS program focuses on development of standoff weapons systems to counter mine and obstacle threats in the surf and beach zones. The program uses a "System of Systems" approach that includes development and fielding of the Coastal Battlefield Reconnaissance and Analysis (COBRA) mine/obstacle detection system; Countermine System (CMS); and counter-obstacle, precision craft navigation, lane marking, and C4I capabilities. Near-term capability is scheduled to be fielded in FY 2007 with IOC scheduled for FY 2015. Platform for the COBRA system is the VTUAV. Platforms for employment of the breaching mechanisms include naval strike and U.S. Air Force combat aircraft.

Status
The program is funded. The COBRA system achieved Milestone B for its Block I capability in FY 2006. The JDAM Assault Breaching System (JABS), which provides a near-term breaching capability against unburied mines and obstacles as a contingency capability in FY 2006, is scheduled for IOC in FY 2007.

Developers
Northrop Grumman; Melbourne, Florida

Lightweight Hybrid Torpedo (LHT)

Description
The MK-54 LHT is a modular upgrade to the lightweight torpedo inventory and is designed to counter quiet diesel-electric submarines operating in the shallow water littoral environment. LHT combines existing torpedo hardware and software from the MK-46, MK-50, and MK-48 Advanced Capability (ADCAP) programs with advanced digital COTS electronics. The resulting MK-54 LHT offers significantly improved shallow water capability at reduced life-cycle costs. While the baseline MK-54 will provide the warfighter with improved shallow water performance, the MK-54

P3I program will modernize the MK-54 by taking continuous advantage of technology advancements during the hardware acquisition process while addressing current weapon limitations and evolving threats and countermeasures. The MK-54 modernization plan will leverage the spiral acquisition process to synergistically introduce new hardware and software updates that will provide step-like increases in probability of kill while reducing life-cycle cost and allowing the torpedo to remain ahead of the evolving littoral submarine threat.

Status
Milestone II was achieved in FY 1996 along with an EMD contract award. A successful CDR was held in November 1999 with developmental testing beginning in July 1999. The LRIP contract was awarded in early FY 2000. The MK-54 program completed OPEVAL in third quarter FY 2004, and achieved IOC in fourth quarter FY 2004. Full Rate Production began in FY 2005, with a procurement of 94. The approximate total buy for the program is expected to be 1,500. The MK-54 is planned to achieve FOC in FY 2011.

Developers
Raytheon; Mukilteo, Washington

MK-15 Phalanx Close-In Weapon System (CIWS)

Description
The MK-15 Phalanx CIWS is an autonomous combat system capable of searching (Ku-band radar), detecting, tracking (radar or electro-optic), controlling, and engaging the threat with a 20mm gatling gun capable of firing 4,500 tungsten rounds per minute. An integral element of ship self-defense and the anti-war warfare defense-in-depth concept, CIWS provides terminal defense against Anti-Ship Cruise Missiles (ASCMs) and high-speed aircraft penetrating outer fleet defensive envelopes. Phalanx CIWS can operate autonomously or be integrated with the ship's combat system. The CIWS Block 1B Surface Mode configuration further provides defense against small, fast, surface craft and slow-flying helicopters and aircraft with the addition of an integrated Forward Looking Infra-Red (FLIR). All CIWS configurations in the Fleet are programmed to be upgraded to Block 1B with an estimated completion date in FY 2012. The Block 1B Baseline 2 radar upgrade was developed to address 228 obsolete material issues. This radar upgrade will provide the system with a 15 dB sensitivity improvement.

The MK-15 Mod 29 is the Land-based Phalanx Weapon System (LPWS) developed to counter rocket, artillery and mortar attacks. LPWS is basically a Phalanx CIWS mounted on a low-boy trailer configured with portable power generation and cooling systems.

The LPWS is presently deployed in Iraq defending the troops from rocket and mortar attacks.

The MK-15 Mod 31 is the Phalanx SeaRAM system. SeaRAM is a Block 1B Baseline 2 Phalanx CIAN configuration with the gatling gun replaced with an 11-round Rolling Airframe Missile (RAM) launcher guide. SeaRAM is also an autonomous (or integrateable) combat system capable of searching, detecting, tracking, controlling and engaging the threat with RAMs. SeaRAM is part of both General Dynamics and Lockheed Martin Littoral Combat Ship (LCS) configurations.

Status
More than 275 Phalanx CIWS systems are presently deployed in the U.S. Navy. The Phalanx CIWS Block 1B Baseline 2 radar upgrade and SeaRAM weapon system are presently undergoing developmental testing (DT) on the Self-Defense Test Ship (SDTS). Three SeaRAM systems are presently scheduled to be delivered to the LCS shipbuilding program through FY 2008. Acquisition of Phalanx CIWS continues in sufficient numbers to support new-construction warship delivery. In FY 2006, 39 CIWS 1Bs were procured with the remaining 120 scheduled across the FYDP (FY 2007-2012). The U.S. Army has procured a total of 22 LPWS systems for defense of their forward operating bases in Iraq and is expected to procure additional LPWS systems.

Developers
Raytheon; Tucson, Arizona

MK-48 Advanced Capability (ADCAP) Torpedo/CBASS-Common Broadband Advanced Sonar System

Description
MK-48 heavyweight torpedoes are used solely by submarines and are employed as the primary ASW and ASUW weapon in attack submarines and as the principal defensive weapon in strategic ballistic-missile submarines. Additionally, three allied countries have acquired the MK-48 torpedo. With a need to continue torpedo performance-upgrade programs to counter continuously evolving threats, the Navy developed the MK-48 ADCAP torpedo.

MK-48 ADCAP: The MK-48 Mod 5 ADCAP torpedo is the replacement for the MK-48 Mod 4 torpedo. Authorized for full production in 1990, the ADCAP counters surface-ship and submarine

threats with greater speed and accuracy than any other submarine launched torpedo in the Navy's history. It is a heavyweight acoustic-homing torpedo with sophisticated sonar, all-digital guidance and control systems, digital fusing systems, and propulsion improvements. Its digital-guidance system allows for repeated improvements to counter evolving threats through software upgrades. The last new ADCAP torpedo was delivered in 1996. To improve future performance, several upgrades are being made to the existing ADCAP inventory.

ADCAP Modification Program (MODS): The MODS program implements significant software and hardware improvements to the existing ADCAP inventory to improve ADCAP operational capability in the next torpedo generation.

MK-48 Mod 6 ADCAP: The MK-48 Mod 6 gains two significant improvents over the Mod 5 following MODS program upgrade, one in guidance and control (G&C Mod), and the other in the torpedo propulsion unit (TPU Mod). The G&C Mod improves the acoustic receiver, replaces the guidance-and control set with updated technology, increases memory, and improves processor throughput to handle the expanded software demands required to improve torpedo performance against evolving threats. The TPU Mod provides a tactically significant reduction in torpedo radiated-noise signatures.

MK-48 Mod 7 Common Broadband Advanced Sonar System (CBASS): CBASS is a significant hardware and software upgrade to the MK-48 Mod 6 torpedo. The CBASS program is a joint development program with the Royal Australian Navy. It will include a new broadband sonar system (and its associated software) to achieve significant increases in operating bandwidth. The system will also include new broadband processing algorithms that will improve CCM and shallow-water performance while retaining deep-water performance characteristics. With the standup of a Royal Australian Navy MK-48 ADCAP intermediate maintenance capability in Australia, both Navies will be ready for joint operational testing to be conducted in waters off Australia. The first CBASS in water runs were conducted in September 2004 and the MK-48 Mod 7 CBASS torpedo completed IOC in FY 2006. The MK-48 ADCAP is and will remain the Navy's primary submarine launched conventional Anti-Submarine Warfare and Anti-Surface Warfare torpedo through 2026.

Operational Software Upgrades: Software upgrades have been and will be developed and integrated into the MK-48 ADCAP. Changes in threat scenarios, such as the inclusion of littoral operating areas, the increased availability of modern countermeasures, and the proliferation of diesel submarines, are the major impetus for updating software. Performance issues, including deficiencies discovered during fleet exercises and developmental testing, also will be resolved during these updates. The MK-48 ADCAP Torpedo Spiral Development program involves improving torpedo performance through software upgrades primarily against the

shallow water diesel threat. Spiral 1 is expected to provide a 25 percent increase in torpedo effectiveness against targets in shallow water.

Status
The first phase of Spiral 1 has been completed. Full Spiral 1 developmental and operational testing will be completed in FY 2007. Spiral 2/3 development is in progress with developmental and operational testing expected in FY 2008. Spiral 4 is planned for FY 2010. The MK-48 ADCAP Mod 6 ACOT completed development testing in November 2004 and completed operational testing in November 2005 with fleet release expected in 2007. The MK-48 ADCAP Mod 7 (CBASS) is in operational testing with IOC completed in FY 2006. A total of 1,263 units are slated for conversion through the life of the program.

Developers
Raytheon Systems Corporation; Keyport, Washington

Navy Ballistic Missile Defense (BMD)

Description
Aegis BMD includes modifications to the Aegis Weapon System and the development and upgrade of the Standard Missile 3 (SM-3) with its hit-to-kill kinetic warhead. This combination gives select Aegis cruisers and destroyers the capability to intercept short and medium-range ballistic missiles in the ascent, midcourse, and descent phases of their exo-atmospheric trajectories. Additionally, Aegis BMD provides surveillance and tracking capability against long-range ballistic missile threats. Together, these capabilities contribute to robust defense-in-depth for U.S. and allied forces, vital political and military assets, population centers, and large geographic regions against the threat of ballistic missile attack. The Missile Defense Agency and the Navy deployed the Aegis BMD long-range surveillance and tracking capability as an element of the Ballistic Missile Defense System (BMDS) in October 2004. The Aegis BMD short and medium range ballistic missile engagement capability was certified for operational use in August 2006.

Status
Today, ten destroyers have the LRS&T capability, and are able to cue the greater BMDS. Additionally, three Aegis cruisers and three destroyers have both the LRS&T and an engagement capability using the SM-3 missile. These ships are available to conduct emergency active defense against short and medium-range ballistic missiles and to cue the BMDS in defense of the homeland. Five additional destroyers are planned to have these capabilities in CY 2007. In June 2006, an SM-3 fired from USS *Shiloh* (CG 67) successfully intercepted a separating ballistic missile target out-

side the earth's atmosphere. This was the seventh intercept since January 2002 The Aegis fleet plays a significant role in the nation's future BMD plans. The ongoing open architecture Combat System development affords the opportunity for an even larger contribution as our Aegis Fleet is modernized. In May 2006, USS *Lake Erie* (CG 70) successfully engaged a Short Range Ballistic Missile (SRBM) intercept using a modified Linebacker computer program and a modified SM-2 Block IV missile. MDA will install this sea-based Terminal (SBT) Ballistic Missile Defense Capability in the Aegis BMD Computer Program. A certified SBT capability will be available by 2009. This will provide an endo-atmospheric "lower tier" capability resulting in a more lethal layered defense against enemy ballistic missiles.

Developers
Lockheed Martin; Moorestown, New Jersey
Raytheon; Tucson, Arizona

RIM-7, RIM-162 NATO Sea Sparrow Missile System (NSSMS) and RIM-162 Evolved Sea Sparrow Missile (ESSM)

Description
The MK-57 NSSMS is deployed in the Aircraft Carrier (CV/CVN) and Multipurpose Amphibious Assault Ship (LHD) classes and is being installed in the newest Multipurpose Amphibious Assault Ship (LHA 6) class. The MK-57 NSSMS and its associated RIM-7 NSSM or RIM-162 ESSM serves as the primary end-to-end surface-to-surface and surface-to-air ship self-defense missile system. The MK-57 NSSMS has undergone a series of modifications, including the implementation of a COTS solution that reduces maintenance and manpower requirements, minimizes cost of ownership and integrates ESSM into the combat system increasing battlespace and firepower. The focal point of the upgrade was to increase the Operational Availability and Mean Time Between Critical Failure. Target Acquisition System (TAS), engineered to support ships in ADW, is a combined volume search radar with a control element that determines Threat Evaluation and Weapon Assignment for RIM-7 in LHD and CVN-class ships. TAS interfaces with the Advanced Combat Direction System (ACDS) and the RAM Guided Missile Launching System (GMLS).

ESSM is the next generation of Sea Sparrow missiles, replacing the RIM-7, currently deployed on the *Arleigh Burke* (DDG 51) Flight IIA Aegis destroyers. ESSM will be the premier self-defense weapon for DDG Mod, DD(X), CVN, CVN 21 and LHA 6-class ships, as well as for Aegis cruisers receiving the Cruiser Modernization. ESSM is a kinematic upgrade to the improved RIM-7P missile. It

was designed to defeat advanced highly maneuverable threats. The upgrades consist of a more powerful rocket motor, a tail control section for increased responsiveness, VLS capability, upgraded warhead, and a quick-reaction electronic upgrade. Enhanced ESSM kinematics and warhead lethality will leverage the robust RIM-7P guidance capability to provide increased operational effectiveness against high-speed maneuvering hardened anti-ship cruise missiles at greater intercept ranges than is now possible with the RIM-7P. ESSM will introduce a surface-to-surface/anti low-velocity air threat capability in 2007. Operational in 2004, ESSM is being procured as an international cooperative initiative involving ten countries in the NATO Sea Sparrow Consortium.

Status

In-service support of NATO Sea Sparrow systems is complete. ESSM successfully completed OPEVAL testing in mid-2003, reached Milestone III and achieved full-rate production in January 2004, and has an In-Service Support MOU in place. IOC occurred in FY 2004 with fleet introduction on an *Arleigh Burke* Flight IIA destroyer. ESSM Fleet introduction in CVN class ships is scheduled for FY 2008 including both AAW and improved ASUW capability.

Developers

Raytheon; Tucson, Arizona

RIM-66C SM-2 Standard Missile-2 Blocks III/IIIA/IIIB

Description

Standard Missile-2 (SM-2) is the Navy's primary area air defense weapon. Deployed SM-2 Block III/IIIA/IIIB configurations are all-weather, ship-launched, medium-range surface-to-air missiles currently in service with the U.S. Navy and seven allies. SM-2 provides a robust area air defense layer required for maintaining forward naval presence, operating in the littorals and projecting and sustaining U.S. forces in distant anti-access or area-denial environments. SM-2 Block III/IIIA/IIIB missiles are launched from the MK-41 Vertical Launching System (VLS) installed in Aegis cruisers and destroyers. It employs inertial mid-course guidance with command updates from the shipboard fire control system and an Electronic Countermeasure (ECM)-resistant mono pulse receiver for semi-active radar terminal homing. Each SM-2 block upgrade is progressively more capable and continues to evolve to provide enhancements in very high and very low altitude intercepts, stressing ECM environments, and against low altitude, supersonic maneuvering threats. Block III features improved performance against low-altitude threats and optimizes the trajectory shaping resident within command guidance from the Aegis weapons system by implementing Shaping and Fuse Altimeter engineering change improvements. Block IIIA features significantly enhanced performance and lethality against sea-skimming threats due to a new directional warhead and Moving Target Indicator (MTI) fuse design in addition to enhanced trajectory-shaping functionality.

Block IIIB builds on the Block IIIA improvements by adding an infrared (IR) guidance mode capability developed in the Missile Homing Improvement Program (MHIP) to improve performance in a stressing ECM environment. The IIIB MHIP dual-mode RF/IR guidance capability is being incorporated to counter a specific fielded and proliferating electronic warfare system in existing aircraft and cruise missile threats. Blocks IIIA/IIIB will be the heart of the SM-2 inventory for the next 15 years. The latest generation of Block IIIB missiles includes a maneuverability upgrade (SM-2 Block IIIB w/MU) to enhance IIIB performance against low-altitude, supersonic maneuvering threats.

Status

SM-2 Block III/IIIA/IIIB missiles are currently deployed. Block IIIB is the only variant in production for the U.S. Navy, although Block IIIA is still produced for Foreign Military Sales. Block IIIB MUs are being produced as new all-up rounds and as upgrades from older Block III and IIIA missiles through the Service Life Extension Program. FY 1995 was the first year of production for the SM-2 Block IIIB, which achieved IOC in FY 1997.

Developers

Raytheon; Tucson, Arizona

RIM-116A Rolling Airframe Missile (RAM)

Description

RAM is a high-firepower, low-cost system designed to engage anti-ship cruise missiles (ASCMs) in the stressing electronic counter measures (ECM) littoral conflict environment. RAM is a five-inch diameter surface-to-air missile with passive dual-mode radio frequency/infrared (RF/IR) guidance and an active-optical proximity and contact fuse. RAM has minimal shipboard control systems and does not require shipboard information after launch. Effective against a wide spectrum of existing threats, the RAM Block1 IR upgrade incorporates IR "all-the-way-homing" to improve performance against evolving passive and active ASCMs. Current plans are for RAM to continue evolving to keep pace with emerging threats.

Status

RAM is installed in *Tarawa* (LHA 1)-class amphibious assault ships; seven *Wasp* (LHD 1)-class amphibious assault ships; eight *Whidbey Island* (LSD 41)-class dock landing ships; four *Harpers Ferry* (LSD 49)-class dock landing ships, nine (CV/CVN) aircraft carriers and two *San Antonio* (LPD 17) class landing platform dock ships; RAM is also planned for installation on all remaining in commission aircraft carriers by FY 2007 as well as for all LPD 17 class ships, CVN 77, LHD 8, LHA 6 and flight 0 LCS. Block 0 missiles and launchers completed their final production run on schedule, and the missile has had successful intercepts in177 of 186 production-acceptance and ship-qualification tests. The

Block 1 missile has completed the most stressing OPEVAL ever attempted using the Self-Defense Test Ship-23 of 24 successful firings-and has completed developmental/operational testing, with IOC in FY 2000. Block 1 is currently at full-rate production. So far the program has procured 90 missiles in FY 2000, 90 in FY 2002, 106 in FY 2003, 90 in FY 2004, 90 in FY 2005, 90 in FY 2006, and an additional 630 programmed from FY 2007-2013. We are heavily invested in the development of the RAM Block 2 missile. RAM Block 2 is a kinematic upgrade to the missile for countering maneuvering threats and regaining battlespace. IOC for RAM Block 2 is scheduled for FY 2011. RAM Block 2 will eventually replace Block 1 missiles.

Developers
Raytheon; Tucson, Arizona
RAMSYS; Germany

SM-6 Extended-Range Active Missile (ERAM) Block I/II

Description
The Navy's next-generation Extended Range Air Defense Warfare (ADW) interceptor, SM-6 is a transformational surface-to-air missile. With its active-seeker technology, SM-6 will meet the anticipated theater air and missile warfare threat well into the next decade, providing an essential element of the Navy's Sea Shield vision. Introduction of active-seeker technology to Air Defense in the Surface Navy reduces Aegis Weapon System reliance on illuminators and provides improved performance against stream raids and targets employing advanced characteristics (maneuverability, low radar cross section, kinematics, and advanced electronic countermeasure features). SM-6 is a critical pillar of the Navy's Integrated Fire Control-Counter Air (NIFC-CA) capability and will provide a significant contribution to the Joint Integrated Fire Control operational architecture. The evolutionary acquisition strategy will leverage alignment of technology paths among Naval Sea Systems Command (NAVSEA), Naval Air Systems Command (NAVAIR), and the U.S. Air Force across multiple missions and missile production lines to dramatically reduce technology development, recurring production, and life cycle costs. The SM-6 ERAM acquisition strategy is characterized as a low-risk development approach which leverages the SM-2 Block IV/IVA program Non-Developmental Items and Raytheon's Advanced Medium Range Air-to-Air Missile (AMRAAM) Phase 3 active seeker program for NAVAIR. The SM-6 need is documented in the Mission Needs Statement for Joint Theater Air and Missile Defense, Theater Air and Missile Defense Capstone Requirements Document (CRD), and in the Ship Class Anti-Air Warfare Self-Defense CRD. The specific requirements are documented in the Operational Requirements Document for Standard Missile-6 (SM-6) ERAM, signed by the CNO on 1 May 2004. The SM-6 missile will be fielded on legacy DDG 51 and CG 47 class ships as well as the future CG(X) warship.

Status
Navy established the SM-6 ER Air Defense program in PB 2004, with an FY 2010 IOC. The Joint Requirements Oversight Council (JROC) approved the Operational Requirements Document 23 June 2004 following a Milestone B Defense Acquisition Board decision 15 June 2004 designating SM-6 an ACAT 1D program. SM-6 successfully completed its Design Readiness Review in 2006, ahead of schedule. Spiral development for Block II will achieve full Joint Integrated Fire Control engagement operations and could include expanded capabilities to support sea-based terminal ballistic missile defense.

Developers
Raytheon; Tucson, Arizona

UGM-133A Trident II/D5 Submarine-Launched Ballistic Missile (SLBM)

Description
The Trident II/D5 is the sixth generation of the Navy's Fleet Ballistic Missile (FBM) program, which started in 1955. The D5 is a three-stage, solid propellant, inertial-guided submarine-launched ballistic missile (SLBM) with a range greater than 4,000 nautical miles and accuracy measured in hundreds of feet. The first eight *Ohio*-class submarines were configured to carry 24 Trident I/C4 missiles SLBMs. The ninth ship, USS *Tennessee* (SSBN 734), and all later ships were armed with the Trident II/D5 missile system. Conversion of four of the C4 ships to carry the Trident II/D5 missile began in FY 2000 and will be completed in FY 2008, although all SSBNs now deploy with only the D5 missile. Trident missiles are capable of carrying W76 or W88 Multiple Independently Targeted Reentry Vehicles (MIRVs). In operation, Trident II/D5 missiles have been declared at eight MIRV warheads under the Strategic Arms Reduction Treaty (START). The Navy continues to address future deterrence requirements against weapons of mass destruction and disruption, and the Trident II/D5 will ensure that the United States has a modern, survivable strategic deterrent. Recent efforts are underway to provide some capability for existing D5 missiles to carry a conventional warhead. Known as the Conventional Trident Modification (CTM), this effort would be the first weapon capable of precisely delivering conventional munitions to high value targets world wide, with very little notice.

Status
FY 2007 funding will be dedicated to the D5 life extension program. Full missile procurement begins in FY 2008 ending in FY 2012 with a total acquisition of 108 additional missiles.

Developers
Lockheed Martin; Sunnyvale, California

Stabilized 25-mm Chain Gun

Description
This upgrades the current MK-38 25-mm chain gun with stabilization, remote operation, fire control, and EO sensor, significantly expanding the effective range of the gun and expanding its use to night time operations. The program fills the surface self-defense capability gap for ships and is designed to engage real-time asymmetric threats at close range to ships in port, at anchor, or while transiting choke points or operating in restricted waters. It provides the capability to bridge current and future targeting and weapons technology in a close range force protection environment.

Status
Originally installed as a quick fix for ships last in the line to receive CIWS BLK 1B upgrade, the fleet has subsequently requested expanding the 25-mm gun program to include all surface ships. PB 2008 budget funds 168 stabilized mounts on CGs, DDGs, and LSDs. Currently installed on 15 ships with an additional 21 ships scheduled to receive the guns by 1 October 2007.

Developers
BAE; Louisville, Kentucky
Rafael USA, Inc.; Haifa, Israel

Threat ASCM, Missile, and Aircraft Surrogates

Navy Ranges Branch (Targets)

Description
The Navy Aerial Target Program assesses foreign threats, develops targets to represent the threats, and procures targets for fleet training and weapon system test and evaluation. The current inventory includes drones that represent the following types of threats: high-altitude supersonic missiles (AQM-37), aircraft (QF-4), subsonic sea-skimming anti-ship cruise missiles (BQM-34, BQM-74), and supersonic sea-skimming cruise missiles (GQM-163A). In addition, the Navy is conducting a pre-planned product improvement on the primary subsonic aerial target, the BQM-74E. The follow-on to the BQM-74E, the BQM-74F, will be a faster, more maneuverable subsonic aerial target with increased range and endurance to challenge weapons systems and better train sailors.

Status
The GQM-163A developmental efforts were completed in May 2005 with first delivery of low-rate production assets occurring in third quarter 2005. A total of 39 production assets are currently on contract with an additional award of 10 for FY 2007. The GQM-

163A serves as a replacement for the Vandal (MQM-8G). The Navy has been working to procure MA-31 targets to meet a power-dive requirement, however, this foreign procurement has not been successful. A power dive capability is being integrated into the GQM-163 and this capability will be demonstrated in mid FY 2008. BQM-74F targets will enter the fleet in FY 2010. The Navy is also incorporating autonomous pre-planned flight profiles for the BQM-74 which would reduce the need for target control stations and enable the target to fly in areas where target control is not available. The Navy has discontinued its QF-4 program and now conducts test and evaluation events with Navy crews on U.S. Air Force ranges against QF-4s procured from the Air Force. The Navy and Air Force have formed a team to develop an AoA to determine a follow on full scale target to replace the aged QF-4.

Developers
BQM-74 E/F: Northrop Grumman; Rancho Bernardo, California
GQM-163A: Orbital Sciences; Chandler, Arizona
MA-31: Boeing Company; St. Louis, Missouri

SENSORS

Airborne

AAR-47 Missile Approach Warning System (MAWS)

Description
The AAR-47 is a passive MAWS consisting of four sensor assemblies, a central processing unit, and a control indicator. Employed on helicopters and transport aircraft across U.S. Armed Services, the AAR-47 MAWS warns of threat missile approach by detecting radiation associated with the rocket motor and automatically initiates flare expenditure. The MAWS provides attacking missile declaration and sector direction finding and is interfaced directly to the ALE-39/47 countermeasures dispenser. The fully fielded AAR-47(V)2 upgrade improved missile warning performance, added laser warning functionality, and reduced operations and support costs of legacy AAR-47 systems. AAR-47A(V)2, which is in full-rate production, adds dynamic blanking to mitigate impacts of own ship flares on missile warning performance. Without the AAR-47, helicopters and fixed-wing aircraft have no infrared missile detection capability.

Status
AAR-47A(V)2 is in full-rate production. Work has begun on an advanced two-color IR Missile Warning Sensor and laser-based countermeasure, which were demonstrated by the Tactical Aircraft Directed Infra-Red Counter-Measure (TADIRCM) Advanced Technology Demonstration (ATD) and early operational assessment. This revolutionary technology may be fielded in a fu-

ture version of AAR-47. The Navy plans to buy AAR-47A(V)2 for every new assault support aircraft in the FYDP (MV-22, UH-1Y, AH-1W, KC-130J, etc). The procurement objective for retrofit kits is 1,090.

Developers
Alliant Defense Electronic Systems; Clearwater, Florida

ALR-67(V)3 Advanced Special Receiver

Description
The ALR-67(V)3 is a Radar Warning Receiver designed to meet Navy requirements through the year 2020. It will enable Navy F/A-18E/F aircraft to detect threat radar emissions, enhancing aircrew situational awareness and aircraft survivability.

Status
The ALR-67(V)3 program successfully completed EMD phase and operational testing in 1999 and is in full-rate production. Production quantities will eventually outfit all F/A-18E/F aircraft.

Developers
Raytheon; Goleta, California

ALQ-214 Integrated Defensive Electronic Counter-Measures (IDECM)

Description
Employed on the F/A-18E/F, the ALQ-214 IDECM is used to defend the host aircraft against radar-guided Surface-to-Air Missile (SAM) systems. Either through a towed decoy or several onboard transmitters, the ALQ-214 produces complex waveform radar jamming that defeats advanced SAM systems.

Status
The ALQ-214 and ALE-50 (towed decoy) combination is currently in full-rate production. The ALE-55 Fiber Optic Towed Decoy is currently in developmental test and is scheduled to begin operational testing in FY 2007.

Developers
BAE Systems; Nashua, New Hampshire

Naval Aviation Improved Chemical, Biological, Radiological Nuclear Defense (CBRND)

Description
The Naval Aviation CBRND program is part of a joint-service effort to provide the warfighter with the means to sustain flight operations during the threat or use of Chemical and Biological (CB) weapons of mass destruction. Naval Aviation is the lead service for the Joint Protective Aircrew Ensemble (JPACE) chemical/biological protective flight suit, which provides protection from CB warfare agents. Naval Aviation is also participating in the development of the Joint Service Aircrew Mask (JSAM), which provides head-eye-respiratory CB protection. Furthermore, Naval Aviation is participating in several joint CBRND developmental and acquisition programs that will provide the capability for in-flight automated point and standoff detection of chemical agents, as well as fielding solutions and applicators to restore aviation assets by thorough decontamination of aircrew personnel, aircraft, and sensitive equipment.

Status
JPACE IOC is scheduled for second quarter FY 2007 and will complete in first quarter FY 2013. The JSAM formal Request for Proposal for the initial fixed-wing and helicopter variants was released in September 2005. Source selection is completed. JSAM IOC is scheduled for first quarter FY 2008.

Developers
Creative Apparel (JPACE production); Belfast, Maine
Gentex (JSAM development); Rancho Cucamonga, California

Small Tactical Un-Manned Air System (STUAS)

Description
The STUAS is a joint USN/USMC, Air Force, SOCOM program to design and deliver a small organic Un-Manned Air System (UAS) for Intelligence, Surveillance, and Reconnaissance (ISR), Communication Relay, and overall battle space awareness. The genesis is a result of the PR-07 ISPP analysis of ISR support for the Global War on Terrorism and from the CONPLAN 7500 assessment. STUAS will utilize a common Ground Control Station (GCS) that will integrate with the Navy Tactical Control System (TCS), as well as the Army one ground control system that will be utilized by the U.S. Marine Corps. STUAS will utilize a modular plug-and-play payload capability to allow for timely changes in vehicle configuration. Each STUAS unit will consist of 3 air vehicles, three payloads, one ground control station and launch/recovery gear. STUAS fills the gap between the large Predator/Globalhawk UAS and the man portable/back-pack size UAS. The

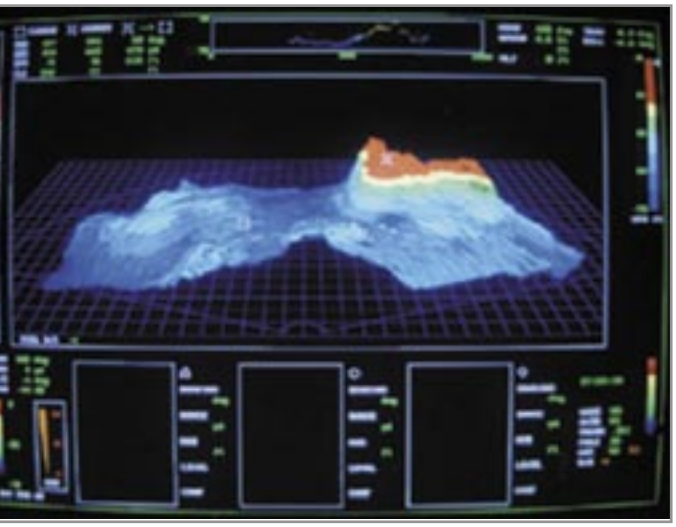
current cost for a 300 hour contract is $8 million with an upcoming anticipated expenditure for the Navy/Marine Corps of nearly $50 million (OMN).

Status
POM 2008 funding has been identified for STUAS which will ensure that the Navy will be able to meet the necessary Milestone B requirements for an FY 2010 IOC. The STUAS ICD has been briefed to the Joint Capabilities Board and has been forwarded and recommended for JROC approval. The CDD is in work and should be ready for comment by mid-year FY 2007. A formal AoA is underway and will be complete by June 2007.

Developers
Boeing; Chicago, Illinois

Subsurface

BQQ-10 Acoustic Rapid COTS Insertion (ARCI)



Description
ARCI is a three-phase program that replaces existing legacy submarine sonar systems, including BQQ-5 (SSN 688), BSY-1 (SSN 688I), BSY-2 (SSN 21), and BQQ-6 (SSBN 726) sonar, with a more capable and flexible COTS-based Open Systems Architecture (OSA), and provides the submarine force with a common sonar system. It allows development and use of complex algorithms that were previously well beyond the capability of legacy processors. The use of COTS/OSA technologies and systems will enable frequent periodic updates to both software and hardware with little or no impact on submarine scheduling. COTS-based processors allow computer power growth at a rate commensurate with commercial industry. A key facet of the sonar ARCI program (now designated BQQ-10) includes the Submarine Precision Underwater Mapping and Navigation (PUMA) upgrade. This consists of software processing improvements delivered as part of Advanced Processor Build (APB) 02, to the BQQ-10 High Frequency (HF, ARCI Phase IV) and BQS-15 EC-19/20 sonar systems. This enhancement provides submarines with the capability to map the ocean floor and register geographic features, including mine-like detections, and display the map in a 3-D representation. This capability to precisely map the ocean floor allows submarines to conduct covert battlespace preparation of the sea bottom as well as survey and avoid minefields with impunity. These digital maps can be compressed and transmitted to other naval forces for display on sea-based and land-based platforms. Additionally, the open architecture design of the ARCI system allows for the rapid insertion of new sensor systems and processing techniques at minimal cost. New sensor systems, such as the low cost conformal array, large vertical array, and advanced towed arrays currently in develop-

ment, will be incorporated in the ARCI system through annual advanced processor build (APB) software improvements and biannual technical insertions of improved processing power.

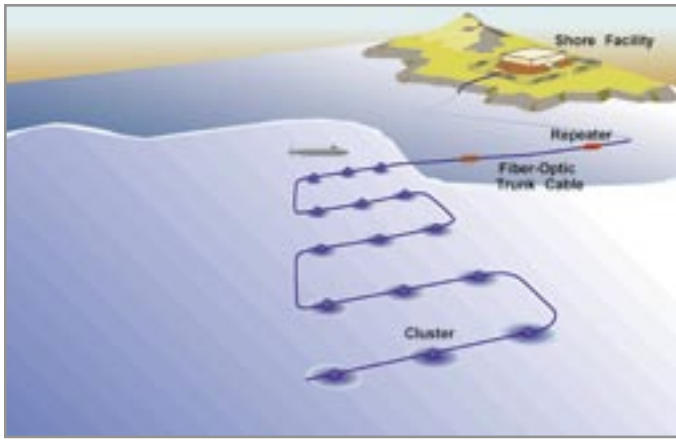
Status

ARCI Phase II (FY 1999) provided substantial towed and hull array software and hardware processing upgrades that significantly improved LF detection capability. Phase III (FY 2001) augments the current Spherical Array DIMUS beam-former with a linear beam-former and enhanced processing that improves MF detection capability. Phase IV (FY 2001) upgrades the HF sonar on improved *Los Angeles* (SSN 688I)-class submarines. Each phase installs improved processing and workstations (point click trackballs, Windows environment). Recent, real world encounters have consistently demonstrated the overwhelming success of this program to restore U.S. acoustic superiority. ARCI completed OPEVAL in FY 2003. The BQQ-10 sonar system is being installed on all submarines as rapidly as possible given the available funding. Continuous improvements via the technical insertion process (every two years) and advanced processor builds (every year) add additional processing and function capability to the system. These improvements include additional towed array processing in support of fleet operations, accelerated delivery of organic mine countermeasures capability inherent in ARCI Phase IV, and adding automation and bell ringer features. Navy research, development, testing, and evaluation will continue to develop processing algorithms from the surveillance, tactical and advanced R&D communities as well as perform laboratory and at-sea testing.

Developers

Lockheed Martin; Manassas, Virginia
General Dynamics Advanced Information Systems; Fairfax, Virginia
Advanced Research Laboratory, University of Texas at Austin; Austin, Texas

Fixed Distributed System Commercial Off-The-Shelf (FDS-C)



Description

FDS-C is a COTS version of the long-term, passive acoustic fixed surveillance FDS system. FDS-C provides threat location information to tactical forces and contributes to an accurate maritime picture for the Joint Force Commander. Due to its strategic positioning and long lifetime, it provides indication and warning of hostile maritime activity before conflicts begin. Both FDS and FDS-C comprise a series of arrays deployed on the ocean floor in deep-ocean areas, across straits and other chokepoints, or in strategic shallow water littoral areas. The system is made up of two segments: the Shore Signal and Information Processing Segment

(SSIPS), which handles the processing, display, and communication functions, and the Underwater Segment, which consists of a large area distributed field of acoustic arrays. FDS-C was developed as a less-expensive follow-on version of FDS by converting to COTS equipment. Taking advantage of advances made in the commercial industry provides a much more cost-effective FDS-caliber system to meet the fleet's ongoing needs for long-term undersea surveillance. Additionally, the program is pursuing the development of other technologies, such as an all fiber-optic hydrophone passive array, to further increase system reliability and performance at reduced cost.

Status
FDS and FDS-C processing are being upgraded with the Integrated Common Processor (ICP). That will result in increased operator proficiency, increased functionality and savings in logistics support and software maintenance.

Developers
To be determined.

TB-29A Submarine Thin-Line Towed Array

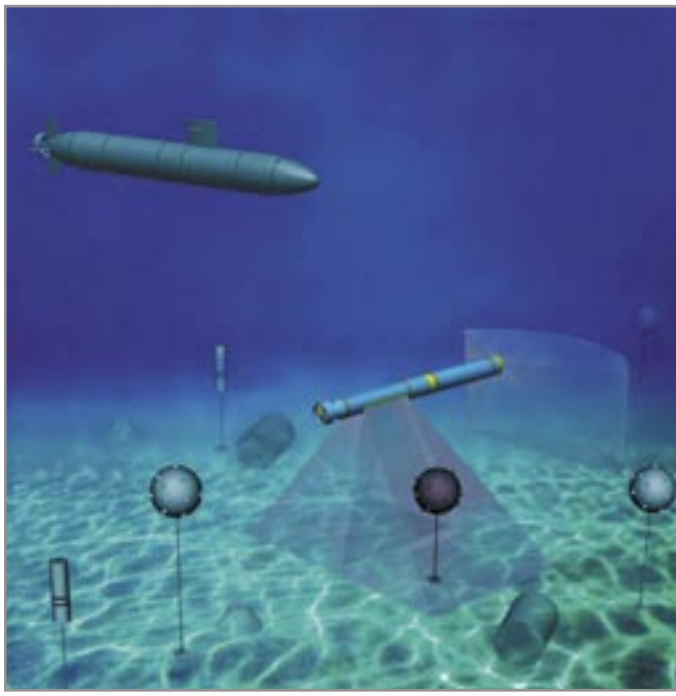
Description
The TB-29A submarine thin-line towed array is a COTS version of the legacy TB-29 towed array. These arrays will be used for backfit on USS *Los Angeles* (SSN 688 & SSN 688I) and USS *Seawolf* (SSN 21)-class submarines and will be forward-fit on the USS *Virginia* (SSN 774)-class submarine. TB-29A will also be used for the SURTASS twin-line towed array system. It will provide greater capability than the current TB-23 thin-line towed arrays and achieve enhanced supportability through commonality. The TB-29A uses COTS telemetry to reduce significantly unit cost while maintaining superior array performance. These arrays were tested on the SURTASS ships and began supporting the IUSS community in FY 2005. Coupled with the submarine ARCI system, TB-29A arrays provide the same 400-500 percent increase in detection capability against quiet submerged platforms in blue water and shallow water areas, as the current TB-29 has demonstrated.

Status
TECHEVAL and OPEVAL results show the TB-29A performance as superior to the TB-29, giving the *Virginia*-class and the ARCI equipped SSNs a better performing tactical towed array. OPEVAL was conducted during second quarter FY 2003. A total of 11 arrays have been procured and delivered under LRIP I & II. Twelve arrays were procured under LRIP III with deliveries starting in FY 2004. Procurement rates to date have been based upon the availability of limited funding. As a result, in FY 2003 the program sponsor determined that there were insufficient funds to support production

and procurement of TB-29A arrays beyond FY 2004. These shortfalls in funding, coupled with changes in fleet requirements, led to the recommendation to cancel the program. Therefore, during the first quarter of FY 2004 the MDA granted permission to close-out this ACAT Level III program with a final LRIP buy consisting of nine additional arrays. The delivery of the last TB-29A arrays will be in FY 2005. The total procurement of TB-29A arrays upon completion and delivery of the final LRIP buy will be 32.

Developers
Lockheed Martin; Syracuse, New York
L3 Communications; Sylmar, California

Unmanned Undersea Vehicles (UUV)



Description
Several acquisition programs are ongoing within the Navy to field UUV systems to improve current Navy Sea Shield capabilities in enabling assured access. The 2004 Navy UUV Master Plan prioritizes UUV missions to support *Sea Power 21*, and maps intended missions to four distinct vehicle classes (by size). The three highest priority UUV missions—ISR, MCM, and ASW—are the focus of current R&D efforts.

The Long-Term Mine Reconnaissance System (LMRS) is an engineering development vehicles that provides several technologies key to developing a capability to conduct clandestine minefield reconnaissance. In 2005, two LMRS vehicles proved clandestine launch and recovery, autonomous operation, and provided critical battery technology and integration development to enable up to 40 hours of endurance.

The Mission Reconfigurable UUV (MRUUV)—under development—will provide a robust capability to conduct clandestine minefield reconnaissance and Intelligence, Surveillance, and Reconnaissance (electro-magnetic and electro-optical ISR, and Indications and Warning). The MRUUV will include unique capabilities, such as submarine launch and recovery and autonomous operation endurance of more than 40 hours. Sensor and system enhancements are being pursued to expand capabilities in the areas of Precision Underwater Mapping and Navigation, Synthetic Aperture Sonar, Acoustic Communications, and high density renewable energy sources. The 21-inch MRUUV will be of similar size and shape as LMRS and will build upon the LMRS design features. MRUUV represents an enhanced capability by providing reconfigurable sensor packages for potential missions such as undersea search and survey, communications and navigation aids and monitoring for weapons of mass destruction. A Large Displacement MRUUV will be developed as a follow-on to the 21-inch MRUUV and will bring enhancements in endurance and sensor packages.

Status
Since inception, EOD and NSCT-1 UUV programs have been on accelerated schedules. NSCT-1 and EOD UUV interim systems have been fielded and engaged in real world operations. During Operation Iraqi Freedom, NSCT-1 UUVs were deployed in the port of Umm Qasr operating in strong currents and low visibility and validated their operational value to fleet operations. EOD UUVs were used to support Space Shuttle Columbia underwater search and recovery operations and, recently, Hurricane Katrina recovery operations. The use of these UUVs reduced the tactical timeline, minimized risk to man-in-the-minefield systems and improved overall mission effectiveness. The final NSCT-1 S-C-M UUV system prototype evaluation is complete and a production decision was reached in July 2005. IOC for the NSCT-1 S-C-M UUV system will occurred in FY 2006. The NSCT-1 Reacquire and ID UUV program component will reach IOC in FY 2009, with the Neutralization UUV component reaching a production decision in FY 2012. The neutralization component will provide a low-cost mine neutralization capability to the fleet, NSCT-1, and EOD operators. The LMRS completed detail design in August 1999 and is in the EMD Phase. Submarine launch and recovery test is scheduled for completion in April 2007. The 21-inch MRUUV ORD is under review at the joint staff level, with a Milestone B decision expected by 2008. The SAHRV program recently completed OPEVAL. The FY 2007 request includes funding for development of 21-inch MRUUV.

Developers
LMRS: Boeing; Anaheim, California
SAHRV: Woods Hole Oceanographic Institution
NSCT-1:Bluefin Robotics and Hydroid
EOD: Lockheed Martin, Perry Technologies, Bluefin Robotics

Other Manufacturers: SMCM: Hydroid

Surface, Subsurface, and Expeditionary

Air & Missile Defense Radar (A&MD RADAR) Next-Generation Maritime Air & Missile Defense, Multi-Function Advanced Active Phased-Array Radar

Description
The A&MD RADAR advanced radar system is being developed as the primary air and missile defense radar for the Navy's next generation cruiser, CG(X). It is a multi-function, active phased array radar capable of search, detection, tracking of airborne and ballistic missile targets, and missile engagement support. The advanced functions of this radar include multi-mission performance in a stressing environment that will enable simultaneous defense from all Theater Air and Missile Defense (TAMD) threats. The multi-

mission capability will be effective in both air dominance of the battle space (Area Air Warfare) and in defense against ballistic missiles.

Status
The A&MD RADAR is being developed as a competitive program, with requirements definition underway this year, along with several risk-reduction projects to mature technologies for this advanced radar. The design and development after competitor down-select will lead to EDM development, testing, and production to support the IOC for CG(X).

Developers
To be determined.

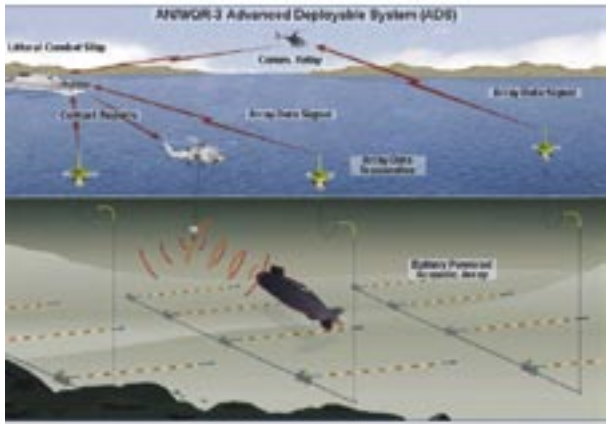
Airborne Laser Mine Detection System (ALMDS)

Description
The ALMDS is an organic, high-area coverage, electro-optic Airborne Mine Countermeasures (AMCM) laser system that detects, classifies, and localizes floating and near-surface moored sea mines. Deployed from the MH-60S helicopter, ALMDS will satisfy the Navy's need for a quick-response, wide-area, organic MCM system that can rapidly detect and classify mine-like contacts for subsequent prosecution. This capability will be critical in littoral zones, confined straits, choke points, operating areas, and Amphibious Objective Areas. ALMDS offers a much greater area search rate than other types of AMCM equipment, and it represents a capability that does not exist in the current inventory.

Status
A competitive contract was awarded in April 2000 for development of an integrated ALMDS system for the MH-60S. Milestone C and LRIP I occurred in FY 2005. The IOC is scheduled for FY 2009.

Developers
Northrop Grumman; Melbourne, Florida

AQS-20A Mine-Hunting Sonar

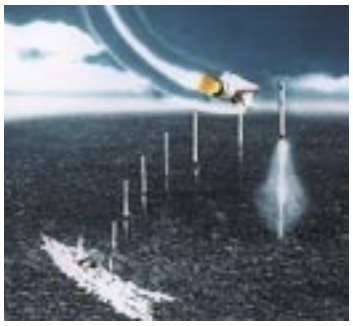


Description
The AQS-20A is an underwater mine-detection sonar that also employs an Electro-Optic Identification (EOID) sensor capable of locating and identifying bottom, close-tethered, and moored sea mines. The AQS-20A mine-hunting system will be deployed and operated from the MH-60S helicopter as one of five organic Airborne Mine Countermeasures (AMCM) weapon systems

resident in carrier/expeditionary strike groups onboard the Littoral Combat Ship (LCS). The AQS-20A system will also serve as the mine sensor subsystem of the Remote Mine Hunting System (RMS) hosted onboard Navy surface warships. The operational RMS system will be installed in the *Arleigh Burke* (DDG 51) Flight IIA Aegis guided missile destroyers beginning with DDG 91.

Status
Milestone C and LRIP I occurred in FY 2005. IOC is scheduled for FY 2007. Improvements to Computer Aided Detection/Computer Aided Classification and Environmental Data Collection capabilities are being implemented via enhanced research and development efforts.

Developers
Raytheon; Portsmouth, Rhode Island



Nulka Radar Decoy System

Description
Nulka is an active, off-board, ship-launched decoy developed in cooperation with Australia to counter a wide spectrum of present and future radar-guided anti-ship cruise missiles. The Nulka decoy employs a broadband radio frequency repeater mounted atop a hovering rocket platform. After launch, the Nulka decoy radiates a large, ship-like radar cross-section flying a trajectory that seduces and decoys incoming ASCMs away from their intended targets. Australia developed the hovering rocket, launcher, and launcher interface unit. The U.S. Navy developed the electronic payload and fire control system. The existing MK-36 Decoy Launching System (DLS) has been modified to support Nulka decoys, resulting in the MK-53 DLS.

Status
Nulka received Milestone III approval for full-rate production in January 1999. Installation began on U.S. and Australian warships in September 1999. Operational testing in 2006 was successful and the system was installed on 88 U.S. Navy ships. The remaining installations will be completed by early 2009.

Developers
BAE Systems; Edinburgh, Australia
SECHAN Electronics Inc.; Lititz, Pennsylvania
Lockheed Martin Sippican; Marion, Massachusetts

Organic Airborne and Surface Influence Sweep (OASIS)

Description
The OASIS system will provide the strike group with an organic, high-speed, magnetic/acoustic influence minesweeping capability to effectively neutralize sea mine threats in operating areas where mine hunting is not possible due to mine burial or high bottom clutter. The OASIS system is one of five Airborne Mine Countermeasures (AMCM) systems under development that will be deployed and operated from the MH-60S helicopter.

Status
Milestone C and LRIP I are scheduled for FY 2007. IOC is scheduled for 2008.

Developers
EDO Corporation; New York, New York

S-Band Volume Search Radar (VSR)

Description
The Volume Search Radar (VSR) is an S-band active phased array radar designed to meet all above-horizon detection and tracking requirements for 21st Century ships without area air-defense missions, specifically the DDG 1000 and CVN 78 classes. VSR will provide long range situational awareness with above-horizon detection and air control (marshalling) functionality, replacing the functionality of today's SPS-48E and SPS-49 radars. A non-rotating phased array, VSR provides the required track revisit times to deal with fast, low/small, and high-diving missile threats, providing cueing for the SPY-3 Multi-Function Radar (MFR) to conduct required tracking and fire control functions above the horizon.

Status
An Engineering and Manufacturing Development array was completed in 2006 and is undergoing string testing in preparation for development testing at the land-based test site in 2007. VSR development, testing and production schedules are aligned with DDG 1000 and CVN 78 shipbuilding schedules. VSR will be fielded as an integrated radar with the SPY-3 MFR, together referred to as the Dual-Band Radar (DBR). OPEVAL will occur with DDG 1000 testing. IOC for the DBR is scheduled for 2013.

Developers
Raytheon Electronic Systems (Prime); Sudbury, Massachusetts
Lockheed-Martin Maritime Sensors & Systems (Subcontractor to Raytheon-VSR Antenna System); Moorestown, New Jersey

SPQ-9B Anti-Ship Cruise Missile (ASCM) Radar

Description
The SPQ-9B is a slotted, phased-array, rotating radar that significantly improves the ability of ships to detect and track low-altitude ASCM in a heavy clutter environment. Its high-resolution track-while-scan, X-band, pulse-Doppler radar enables detection and establishment of a firm track at ranges allowing the combat system to engage subsonic or supersonic sea-skimming missiles at the outer edge of a ship's engagement envelope. SPQ-9B integrates with SSDS MK-2 on aircraft carriers and amphibious assault ships, enabling ASCM defense capabilities to pace the evolving world wide threat. The SPQ-9B is an integral part of the Cruiser Modernization program, providing an ASCM cue to the Aegis Combat System.

Status
The SPQ-9B is being fielded in conjunction with SSDS MK-2 and CG Modernization.

Developers
Northrop Grumman; Melville, New York

Shipboard Protection System (SPS)

Description
SPS is designed to augment current Naval Force Protection Tactics and Doctrine by providing a means to detect, classify, and engage real-time surface threats at close-range to ships in port, at anchor, and while transiting choke points or operating in restricted waters. The system will integrate COTS technology to provide 360° Situational Awareness and will bridge current and future technology by integrating current Force Protection initiatives with combat system technologies. A prototype system installed in the USS *Ramage* (DDG 61) employed COTS-based products interfaced with the ship's existing navigation radar and its key components included electro-optical/infra-red devices (EO/IR), an integrated surveillance system, spotlights, acoustic hailing devices, and remotely operated stabilized small arms mounts (ROSAM). Ramage provided valuable integration and component reliability feedback, lessons learned, and integrated logistics support information which provided the functional demonstration of SPS capability and helped define the formal requirements for SPS.

Status
SPS was approved at Milestone B for system design and development in January 2005. The Capabilities Development Document was approved in January 2005. SPS Block 0, Acoustic Hailing Device (AHD) fielding, is underway. Block 1 installations will commence in FY 2007 and will field the C2 core and EO/IR sensing

system. Block 2 will provide Block 1 capability and integrate MK-49 Mod 0 ROSAM in FY 2007 and early FY 2008. Block 3 will field in FY 2008 and will represent the full realization of SPS capability.

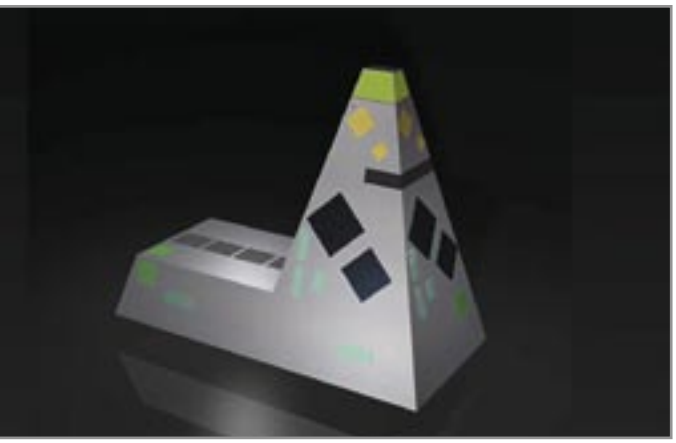
Developers
Naval Surface Warfare Centers; Dahlgren, Virginia; Crane, Indiana
FLIR Systems, Inc.; Wilsonville, Oregon
IML Corp.; Marietta, Georgia
General Dynamics Armament and Technical Products; Charlotte, North Carolina

SPY-1 Aegis Multi-function Phased-Array Radar

Description
The SPY-1 S-Band radar system is the primary air and surface radar for the Aegis Combat System installed in the *Ticonderoga* (CG 47) and *Arleigh Burke* (DDG 51)-class warships. It is a multifunctional, passive phased-array radar capable of search, automatic detection, transition to track, tracking of air and surface targets, and missile engagement support. The fifth variant of this radar, SPY-1D (V), improves the radar's capability against low-altitude, reduced radar cross-section targets in heavy clutter environments, and in the presence of intense electronic countermeasures. The SPY-1 Series radars are also used to detect, track, and engage theater ballistic missiles on select Aegis cruisers and destroyers.

Status
The SPY-1D (V) littoral radar upgrade supersedes the SPY-1D in new-construction Flight IIA destroyers that began in FY 1998. Operational testing and evaluation was completed in the fall 2005. SPY-1D (V) is installed in DDGs 91 through 107 and programmed for installation in DDGs 108 through 112. A new Multi-Mission Signal Processor (MMSP) is funded and will deliver SPY-1D(V) capability to all SPY-1D DDG's. MMSP will be fielded through DDG Modernization.

Developers
Lockheed Martin; Moorestown, New Jersey
Raytheon; Sudbury, Massachusetts



SPY-3 Multi-Function Radar (MFR)

Description
The SPY-3 MFR is an X-band active phased-array radar designed to meet all horizon search and fire control requirements for the 21st Century Fleet. MFR is designed to detect the most advanced low-observable Anti-Ship Cruise Missile (ASCM) threats and support fire-control illumination requirements for the Evolved Sea Sparrow Missile (ESSM), the Standard Missile II (SM-2) and future missiles. The MFR also supports the new ship-design requirement for reduced radar cross-section, significantly reduced manning (no operators), and total ownership cost reduction. The MFR is planned for introduction in DDG 1000 and the next-generation CVN 78 Class aircraft carriers.

Status
Two Engineering and Manufacturing Development (EDM) radar arrays were built and tested at Wallops Island land-based testing facility, with at-sea development testing on board the self-defense test ship conducted in the summer of 2006. Production of the MFR is planned to support equipment delivery schedules for DDG 1000 and CVN 78 Class ships. The MFR will be fielded as integrated radar with the S-Band Volume Search Radar (VSR), together referred to as the Dual-Band Radar (DBR). OPEVAL will occur with DDG 1000 testing. IOC for the DBR is scheduled for 2013.

Developers
Raytheon Electronic Systems; Sudbury, Massachusetts

SQQ-89 Anti-Submarine Warfare (ASW) Combat System

Description
The SQQ-89 ASW combat system suite provides USS *Oliver Hazard Perry* (FFG 7), USS *Ticonderoga* (CG 47), and USS *Arleigh Burke* (DDG 51)-class surface warships with an integrated undersea warfare detection, classification, display, and targeting capability. The system combines and processes all sonar information, and processes and displays all SH-60B Light Airborne Multi-Purpose System (LAMPS) MK-III sensor data. The current system comprises the following subsystems:

- SQS-53C/D active/passive hull-mounted sonar (SQS-56 in FFGs)
- SQR-19 Tactical Towed Array System (TACTAS)
- MK-116 ASW fire control system
- SQQ-28 sonobuoy processor

• SRQ-4 SH-60B helicopter data link

• UYQ-25B Sonar In-situ Mode Assessment System (SIMAS)

• USQ-132 Tactical Display Support System (TDSS)

• SQQ-89(T) Onboard Trainer (OBT)

The analog receivers of the SQS-53A/B hull-mounted sonar are being upgraded to digital receivers by the use of COTS processors, and are re-designated SQS-53D. Planned improvements to the SQQ-89(V) include:

• MH-60R integration

• SRQ-4 Data Link Upgrade

• Multi-Function Towed Array (MFTA) that will provide low and mid-frequency bi/multi-static receiver capability between the SQS-53C, the MH-60R Airborne Low-Frequency Active Sonar (ALFS), and off-board systems

• Remote Mine-Hunting System (RMS) processing and display

• Echo Tracker Classifier (ETC) active classification capability

• SIMAS upgrade to updated performance prediction models

• Computer-Aided Dead-Reckoning Table (CADRT)

• Torpedo Recognition and Alertment Functional Segment (TRAFS)

Status

The AN/SQQ-89 (V)15 EC/200/204 and A(V)15 is the COTS Open Architecture (OA) implementation of the required modernization of legacy ASW systems. It improves the warfighting capabilities in the shallow water littoral warfare environment. DDG new construction, DDGs 103 to 112, will have AN/SQQ-89 (V)15EC200/204 installed. The DDG modernization program upgrades DDG 51 to 78 with AN/SQQ-89A (V)15 and will deliver the first two systems in FY 2012 then three per year until complete. The FY 2007 DDG mod congressional add accelerates the purchase of two AN/SQQ 89A (V)15 systems in FY 2007 for install in FY 2009/FY 2010. The AN/SQQ89A (V)15 back fit program upgrades legacy systems on DDG 79 to DDG 90, and completes the OA migration on DDG 91 to 102. The CG modernization program upgrades the CG 59 to 73 to AN/SQQ-89A (V)15 with the first install in FY 2011. The SQQ-89A (V)15 IOC is FY 2009 and FOC in FY 2014. As a near term adjunct capability, 22 Scaled Improved Performance Sonar (SIPS) systems were purchased and installed on PAC fleet DDGs and CGs.

Developers

Lockheed Martin; Syracuse, New York
Advanced Acoustic Concepts; Hauppauge, New York

Ship-Self Defense System (SSDS)

Description
SSDS provides an integrated combat direction system for aircraft carriers and amphibious ships, enabling them to keep pace with evolving anti-ship cruise missile (ASCM) threats. Adopting an open architecture system, SSDS integrates detection and engagement elements of the combat system with automated weapons control doctrine, Cooperative Engagement Capability (CEC), and tactical data links for enhanced battle space awareness. SSDS provides a robust self-defense capability in support of Sea Shield.

Status
SSDS MK-1 began full-rate production following operational testing in 1997 and is currently fielded in all LSD 41/49 class ships. SSDS MK-2 (which provides strike group interoperability via CEC and TADIL J) achieved IOC in 2005 and continues Fleet installation. Navy plans to periodically upgrade SSDS via COTS Tech Insertion and Preplanned Product Improvement (P3I). SSDS MK-2, programmed for aircraft carriers, LHD 7 and 8, LHA 6 and *San Antonio* (LPD 17) class ships has completed design and is continuing with follow-on at-sea testing. With a federated, technically decoupled architecture, SSDS MK-2 begins initial installation in FY 2008 in USS *Nimitz* and completes fielding by 2015.

Developers
Raytheon; San Diego, California
Technical support: Johns Hopkins University Applied Physics Laboratory; Laurel, Maryland
Naval Surface Warfare Centers; Port Hueneme, California
Naval Surface Warfare Centers; Dahlgren and Dam Neck, Virginia

Surface Electronic Warfare Improvement Program (SEWIP) Block 1 Upgrade

Description
SEWIP is a spiral development block upgrade program for the SLQ-32 Electronic Warfare (EW) system, which is installed on all Q70 in Block IA combatants and auxiliaries in the U.S. Navy, with total fleet wide population of 170 systems. Block 1A replaces the processor with Electronic Surveillance Enhancement (ESE) and display console with UYQ-70. The ESE and UYQ-70 are integrated with Improved Control and Display (ICAD) software. Block 1A also improves Human Machine Interface of the SLQ-32. Block 1B adds Specific Emitter Identification (SEI) capability which offers extremely accurate platform identification; it will be

deployed initially as a stand-alone AN/SSX-1 system (Block1B1) pending integration of SEI with other capabilities (Block1B2). High Gain High Sensitivity (HGHS) receiver functionality (Block 1B3) provides improved situational awareness through non-co-operative detection and ID of airborne platforms, beyond radar horizon and overland passive surveillance supporting all mission areas, and provides extended Nulka queuing ranges. Additional improvements (e.g., initial Network-Centric Warfare Electronic Support (NCWES) interfaces) and upgraded software and displays provide integration of capabilities. Block 1C will incorporate Block 1A and 1B upgrades for active ships (CVN, CG, LHD, LHA, DDG 68-83) and two-way connectivity to Global Command Control System-Maritime netting all Electronic Warfare assets, both local and national.

Status

SEWIP was established as an ACAT II program in July 2002 as a replacement of the cancelled Advanced Integrated Electronic Warfare System (AIEWS). Acquisition Decision Memorandum (ADM) of 13 August 2002 authorized the SEWIP to proceed with Block 1A and initiate development of Blocks 1B and 1C. Block1A Stand-Alone ESE reached at Milestone C/LRIP decision on 31 January 2005. Block 1A achieved full-rate production in August 2006. Block 1B1, the AN/SSX-1, has been authorized as a Rapid Deployment Capability (RDC) for fielding stand-alone SEI capability. Development efforts of Blocks 1B2 and 1B3 are progressing toward FY 2010 TECHEVAL/OPEVAL.

Developers

Northrop Grumman PRB Systems; Goleta, California
Lockheed Martin; Eagan, Minnesota
General Dynamics Advanced Information Systems; Fairfax, Virginia

Surface Ship Torpedo Defense (SSTD)

Description

The SSTD project consists of the AN/WSQ-11 Torpedo Defense System, the SLQ-25A Nixie towed torpedo countermeasure, and expendable acoustic decoys. The purpose of these systems is to provide torpedo protection for all major surface ship types including aircraft carriers, surface combatants, logistics ships, and Military Sealift Command ships. The AN/WSQ-11 Torpedo Defense System includes the functionality of the Nixie system as well as a towed Detection, Classification, and Localization (DCL) subsystem, and a hard kill Anti-Torpedo Torpedo (ATT). The DCL component consists of a towed, active/passive sonar to include a high power transmission source and an acoustic intercept receiver. The DCL array is sized to fit on the existing Nixie handling equipment and use the same deck space and electronics cabinets. The DCL

subsystem can trigger an ATT engagement in either automatic or semi-automatic modes, manual ATT launch mode is also available. The SLQ-25A Nixie is a towed electro-acoustic countermeasure currently in Fleet service on over 150 ships. Performance and reliability upgrades have been in progress since 2004 and will continue through 2009. In addition to Nixie, over-the-side deployed Acoustic Decoys are being acquired to provide an effective and low-cost near term solution to the torpedo defense problem.

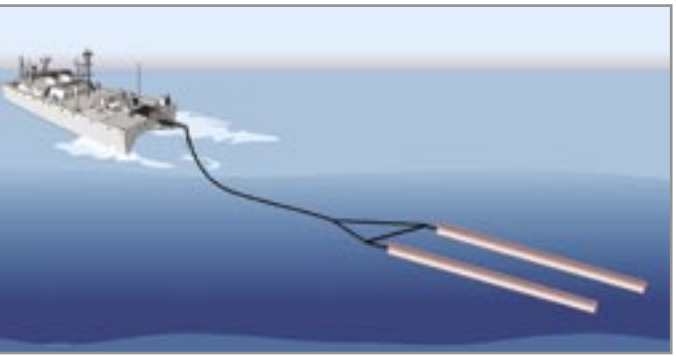
Status

The SSTD project is on track to meet the near-term objectives of concurrently developing the DCL subsystem and the ATT. Two independent DCL systems have been tested side by side at sea in FY 2006 demonstrations. These demonstrations included the firing of approximately ten torpedo test vehicles against each of the systems to evaluate their effectiveness. Initial results indicate consistent ability to detect and track threat torpedoes and salvoes of torpedoes at ranges in excess of the requirement to employ an ATT. The ATT is undergoing a series of in-water tests of the 1st Engineering Development Model (EDM-1). The testing so far has demonstrated all aspects of vehicle preset, launch, water entry, establishment of stable underwater flight and open loop (pre-programmed) maneuverability. Testing is scheduled to conclude in second quarter FY 2007 and will include closed loop homing on a moving target. The ATT effort is scheduled for a Milestone B program decision in FY 2008 and IOC in 2015. The IOC system will integrate the ATT with cruisers and destroyers to leverage the AN/SQQ-89 A(V)15 system as a detection system. Further development of the AN/WSQ-11 system and integration on large deck ships is deferred pending final DCL evaluation.

Developers

Anti-Torpedo Torpedo: Penn State Applied Research Laboratory; Pennsylvania
DCL Systems: Advanced Acoustic Concepts; Long Island, New York
Ultra Electronics; Braintree, Massachusetts

Technical Design Authority: The Naval Undersea Warfare Center; Newport, Rhode Island



UQQ-2 Surveillance Towed Array Sensor System (SURTASS)

Description

The SURTASS capability consists of a mobile fleet of five ships that employ the fleet's most capable deep and shallow water (littoral zone) passive-acoustic towed-array sonar systems. These ships provide passive detection of quiet nuclear and diesel submarines and real-time reporting of surveillance information to theater commanders and operational units. SURTASS employs either a

long-line passive-sonar acoustic array or a shorter twin-line passive-sonar acoustic array. The twin-line system is the best operational shallow water towed array and the only multi-line towed array in the Navy. It consists of a pair of arrays towed side-by- side from a SURTASS ship and offers significant advantages for undersea surveillance operations in the littoral zone. It can be towed in water as shallow as 180 feet, provides significant directional noise rejection, offers bearing ambiguity resolution without turning, allows the ship to tow at higher speed, and results in a shorter time to stabilize the array after a turn.

Status
Five SURTASS vessels are operational in the Pacific Fleet. The first production model TB-29A twin-line SURTASS array was installed in FY 2005, and all SURTASS vessels will have TB-29A twin line arrays by FY 2008. SURTASS is also being upgraded with the Integrated Common Processor (ICP) that will result in increased operator proficiency, increased functionality and savings in Logistics Support and Software Maintenance.

Developers
Lockheed Martin; Syracuse, New York
Lockheed Martin; Manassas, Virginia
BAE Systems; Manchester, New Hampshire
General Dynamics-Advanced Information Systems; Anaheim Hills, California

UQQ-2 Surveillance Towed Array Sensor System (SURTASS)/Low Frequency Active (LFA)

Description
The LFA system, the active adjunct to the SURTASS sonar system, is capable of long range detections of submarine and surface ship contacts. It comprises a low-frequency active sonar transmitter deployed below a SURTASS ship, with the SURTASS passive towed array acting as the receiver. Other Navy ships with towed arrays and compatible processing systems can also process the LFA signal returns in what is known as a "bi-static" mode. As a mobile system, SURTASS/LFA can be employed as a force-protection sensor wherever the force commander directs, including forward operating areas or in support of battle group activities. A UHF SATCOM communication system provides direct voice and data connectivity between the SURTASS/LFA ship and tactical platforms. Two LFA systems exist, installed onboard USNS *Impeccable* (T-23) and the leased R/V *Cory Chouest*. Development continues for the Compact LFA (CLFA) system employing smaller, lighter sources, enabling installation on smaller SURTASS vessels.

Status
SURTASS LFA was successfully reintroduced to the Fleet in January 2003 following a five year hiatus for completion of the En-

vironmental Impact Statement (EIS) process. In October 2003 a Federal District Court enjoined testing and training with LFA for violation of the procedural requirements of the Marine Mammal Protection Act, Endangered Species Act, and National Environmental Policy Act, notwithstanding the court's finding that a national security need existed for employment of LFA and commended the Navy for the breadth of scientific research supporting the EIS. Subject to this injunction, LFA may conduct operations in certain areas within the Philippine Sea, East China Sea, South China Sea, and the Sea of Japan. The Navy released a Draft Supplemental Environmental Impact Statement (DSEIS) in the first quarter of FY 2006. This DSEIS addressed legislative changes to the Marine Mammal Protection Act and pertinent deficiencies raised by the District Court. Currently the program consists of the USNS *Impeccable* (T-23) and one leased vessel, the R/V *Cory Chouest*. The R/V *Cory Chouest* will be deactivated in late FY 2008 at which time the reactivated USNS *Able* (T-AGOS 20) will become operational with the first CLFA system.

Developers
General Dynamics-Advanced Information Systems; Anaheim Hills, California
BAE Systems; Manchester, New Hampshire
Lockheed Martin Naval Electronics & Surveillance Systems; Manassas, Virginia; Syracuse, New York

Tactical Control System (TCS)

Description
TCS provides interoperability and commonality for mission planning, Command and Control (C2), and C4I interfaces for tactical and medium altitude Unmanned Aircraft Systems (UAS). TCS provides a full range of scaleable UAS capability from passive receipt of air vehicle and payload data to full air vehicle and payload C2. TCS offers the warfighter a common core operating environment to receive, process, and disseminate UAS data from two or more different UAS types for reconnaissance, surveillance, and combat assessment. In conjunction with Fire Scout and Littoral Combat Ship (LCS), TCS is positioned to support Sea Shield/Sea Basing pillars and to operate within the FORCENet architecture.

Status
TCS restructure was completed in order to comply with FY 2004 congressional language. The program meets congressional direction to achieve standards-based interoperability and support Navy UAS requirements. TCS continues development of an architecture that includes the following capabilities:

- Standards based implementation
- Incorporation of NATO STANAG 4586 for interoperability

• VTUAV (Fire Scout) functionality and integration with LCS. TCS is scheduled for IOC along with Fire Scout and LCS in FY 2008

• Plug and play capability

TCS flight-testing was initiated in FY 2003 and continues in conjunction with the Fire Scout Program. TCS will be integrated, tested, and fielded in accordance with the schedules of future Navy UAS programs

Developers
System Integrator, Raytheon Systems Inc.; Falls Church, Virginia

WLD-1 Remote Minehunting System (RMS)

Description
The WLD-1 RMS consists of an unmanned vehicle with an AQS-20A Sonar to conduct minehunting operations. The RMS can be launched from the DDG 51 class destroyer and will be incorporated in the design of LCS. RMS is designed to be launched with a pre-programmed search pattern and go over the horizon to search for mines using the AQS-20A Sonar. Once the mission is completed, RMS will return to the ship and data will be downloaded for Post-Mission Analysis (PMA).

Status
Milestone C and LRIP I occurred in FY 2005. IOC is scheduled in FY 2007. First deployment of RMS is scheduled to occur in FY 2007 on DDG 91 class destroyer. Testing on LCS will be completed in FY 2008.

Developers
Lockheed Martin; Riviera Beach, Florida

SEA BASE

PLATFORMS

Aircraft

C-2A(R) Greyhound

Description
The C-2A Greyhound provides critical logistics support to carrier strike groups. Its primary mission is transport of high-priority cargo, mail, and passengers between carriers and shore bases. Powered by twin Allison T56-A-425 turboprop engines and Hamilton-Standard constant speed propellers, the C-2A can deliver a combined payload of 10,000 pounds over a distance of 1,000 nm. The interior arrangement of the cabin can readily accommodate cargo, passengers, and litter patients. Priority cargo such as jet engines can be transported from shore to ship in a matter of hours. A cargo cage system or transport stand provides restraint for loads during launches and landings. The large aft cargo ramp/door and a powered winch allow straight-in rear cargo loading and unloading for fast turnaround. The C-2A's in-flight ramp-open capability allows airdrop of supplies and personnel. Its onboard Auxiliary Power Unit provides engine starting capability and ground power self-sufficiency in remote areas, providing an operational versatility found in no other cargo aircraft.

Status
The aircraft is currently undergoing a Service Life Extension Program (SLEP) to increase operating service life from 15,020 landings and 10,000 flight hours to 36,000 landings and 15,000 flight hours. The changes being incorporated are; Structural Enhancements, aircraft rewire, Avionics Systems improvements and a new propeller system. SLEP will make the C-2A a viable and economically maintainable platform until it is replaced. Additionally, as mandated by Congress and CNO, two passenger carrying safety requirements are being integrated into the C-2A; Traffic Alert and Collision Avoidance System (TCAS) and Terrain Awareness Warning System (TAWS).

Developers
Northrop Grumman; Bethpage, New York

C-37 Executive Transport

Description

The Navy maintains executive transport airlift to support the Navy Departments' DoD Directive 4500.43 designated "required users." Required users must use non-commercial air transport and have specified needs for secure communications and security. The airlift is currently provided by four C-37s (Gulfstream V/550), two C-20Ds (Gulfstream III) aircraft, and one C-20A (Gulfstream III). The C-37 Gulfstream V aircraft has replaced the VP-3A, substantially lowering operating costs. The C-37 meets all known ICAO-imposed Air Traffic Management communications, navigation, and surveillance requirements through FY 2007.

Status

Congress funded the first C-37 in FY 2001. A second aircraft was procured in FY 2004, and two more were placed on contract in 2005 (one was a Congressional add). The first aircraft was delivered to the Navy in August 2002 and is now based at Hickam Air Force Base, Hawaii. The second C-37 arrived in February 2005, the third in May 2006, and the fourth in September 2006; these aircraft are based at Naval Air Facility in Washington, D.C. Additionally, the Navy acquired a surplus C-20A in order to meet CNE executive transportation requirements. The Navy used standard commercial practices to acquire the C-37, which is maintained under full civilian contractor logistics support and warranty—20 years for airframe, five years for engines, and six years for the auxiliary power unit.

C-40A Clipper

Description

The Naval Air Force Reserve provides 100 percent of the Navy's organic intra-theater logistics airlift capability-Navy Unique Fleet Essential Airlift (NUFEA). NUFEA provides Navy Combatant Commanders with short-notice, fast response intra-theater logistics support for naval power projection worldwide. Seventeen remaining C-9 aircraft, which currently perform the majority of these services, are being replaced by the C-40A Clipper, a modified Boeing 737-700 series aircraft. This state-of-the-art aircraft can transport 121 passengers (passenger configuration), 40,000 pounds of cargo (cargo configuration), or a combination of the two (combination configuration), at ranges greater than 3,000 miles at Mach 0.8 cruise speed. The ability to simultaneously carry cargo pallets and passengers maximizes operational capability, safety, and capacity. C-40A features include a new wing with an

advanced-technology airfoil; an electronic flight deck fully compliant with future communications, navigation, and air traffic control architectures; advanced-technology Stage III noise-compliant, fuel-efficient engines; and an integral cargo door/cargo handling system. Maximum gross take-off weight is 171,000 pounds. Until reaching the C-40 aircraft inventory objective, C-9 aircraft will need Communication/Navigation System (CNS) updates in order to comply with Global Air Traffic Management/International Country requirements.

Status
There are currently nine aircraft in inventory. Purchasing aircraft using the best commercial practices, the Navy plans to purchase four more aircraft across the FYDP. Three aircraft are stationed in Naval Air Station (NAS) Joint Reserve Base, Fort Worth, Texas; NAS Jacksonville, Florida; and NAS North Island, San Diego, California.

Developers
Boeing; Seattle, Washington

CH-53K Heavy Lift Replacement (HLR)

Description
The CH-53K is the follow on to the Marine Corps CH-53E Heavy Lift Helicopter. Major systems improvements of the newly manufactured helicopter include larger and more capable engines, expanded gross weight airframe, drive train, advanced composite rotor blades, modern interoperable cockpit, external and internal cargo handling systems, and survivability. The CH-53K will be capable of externally lifting 27,000 pounds on a "Sea Level Hot Day" (103°F) to a range of 110 nautical miles and dropping this cargo in a landing zone at a pressure altitude of 3,000 feet at 91.5°F, a capability improvement that more than doubles the current CH-53E abilities under the same conditions. Additionally, the CH-53K will be capable of carrying a normal load of 32 combat loaded troops, with a maximum capacity of 48 troops. The CH-53K supports the Joint Operations Concept of Full Spectrum Dominance, and *Sea Power 21* by enabling rapid, decisive operations and the early termination of conflict by projecting and sustaining forces to distant anti-access, area-denial environments. Expeditionary Maneuver Warfare (EMW) establishes the basis for the organization, deployment, and employment of the Marine Corps to conduct maneuver warfare and provides the doctrine to make Joint and Multinational operations possible. EMW operational concepts include operational maneuver from the sea, forcible entry operations, sustained operations ashore, and other expeditionary operations. Under these supporting concepts, there is a continuing need for a heavy-lift capability to support sea-based expeditionary operations. The current Marine Corps heavy-lift aircraft, the CH-

53E (designed in the 1960s and introduced in 1980 as an engineering change proposal to the CH-53D), has developed significant fatigue life, interoperability, maintenance supportability, and performance degradation concerns. In order to support the MAGTF and the JTF in the 21st Century Joint environment, an improved CH-53 is required to maintain the Marine Corps' heavy-lift capability through the year 2025 and beyond.

Status
The CH-53K ORD was approved by JROC Memo dated 9 December 2004. Milestone B Defense Acquisition Board was held on 31 October 2005. The program has been approved for entry into Milestone B System Development and Demonstration (SDD) and has been designated an ACAT 1D. A $3 billion SDD contract was awarded to Sikorsky Aircraft Corporation on 5 April 2006 to design, develop, and produce five Engineering, Manufacturing and Development (EMD) aircraft in support of developmental testing. IOC is scheduled for FY 2015. The Marine Corps' requirement is estimated at 156 aircraft.

Developers
Sikorsky Aircraft Corporation; Stratford, Connecticut

KC-130J Hercules Tactical Tanker and Transport

Description
The KC-130 is a four-engine turbo-prop, multi-role, multi-mission tactical aerial refueler and tactical transport aircraft that supports all six functions of Marine Aviation and is well suited to meet the mission needs of the forward-deployed MAGTF. The Hercules provides fixed-wing, rotary-wing, and tilt-rotor tactical in-flight refueling; rapid ground refueling of aircraft and tactical vehicles; assault air transport of air-landed or air-delivered personnel, supplies, and equipment; command-and-control augmentation; battlefield illumination; tactical aero medical evacuation; and combat search and rescue support. The KC-130J, with its increase in speed, altitude, range, performance, state-of-the-art flight station (which includes two heads-up displays, night vision lighting, an augmented crew station, fully integrated digital avionics), enhanced air-to-air refueling capability, and aircraft survivability enhancements provides the MAGTF commander with multi-mission capabilities well into the 21st Century.

Status
The KC-130F and KC-130R have been the workhorses for assault support for the past 40 years. The KC-130J builds on this success while adding greater flexibility. This aircraft can be configured for cargo missions without losing the ability to conduct air refueling, or, if the mission dictates, it can be configured exclusively for refueling by adding an internal fuel tank. Additionally, the KC-

130J can be used as a platform for the establishment of a forward arming and refueling point. The KC-130J provides increased reliability, capability, and mission flexibility with its satellite communications system, survivability enhancements, night systems, and enhanced aircraft systems. The core of the improved communications suite is the ARC-210 radio, which provides UHF and VHF anti-jamming features (HAVEQUICK and SINCGARS), as well as SATCOM. All radios are also enabled for encrypted communication. As a result, the KC-130J is capable of communicating with land, naval, and air forces of all Joint and Coalition services, further extending the capability of the MAGTF. The KC-130J also possesses an improved navigation suite consisting of dual INS and dual GPS, improved radar providing for weather and ground mapping modes, and a digitally displayed moving map.

Developers
Lockheed Martin; Marietta, Georgia

Surface and Expeditionary Warfare Ships and Craft

Joint High Speed Vessel (JHSV)

Description
The JHSV is an intra-theater lift capability prototyped by leased vessels such as *Joint Venture* (HSV-X1), *Swift* (HSV-2), and *West Pac Express* (HSV 4676). These vessels have demonstrated the ability to rapidly embark and transport combat forces during advanced concept technology demonstration testing. In addition, they have participated in exercises and operations around the globe, including *Swift's* deployment as part of Tsunami Relief and Hurricane Katrina disaster relief operations. JHSV is not an assault platform, but provides intra-theater lift capability for company-sized units, including personnel, equipment, and supplies, in support of the Global War on Terrorism and theater security cooperation plans. Design and cost analysis of the JHSV is ongoing, but the leased vessels are capable of speeds in excess of 40 knots and ranges greater than 1,200 nautical miles fully loaded. In addition, the shallow draft characteristics enable them to operate effectively in littoral areas and access small, austere ports. Potential capabilities being evaluated include some medical, command and control, and underway logistics support enhancements, as well as launch and recovery of MH-60S helicopters, rigid hull inflatable boats, and unmanned off-board vehicles.

Status
The JHSV program was formed by a merger of the Army Theater Support Vessel (TSV) and Naval High Speed Connector (HSC)

programs to maximize common capabilities and form a joint platform solution. Navy has been designated the lead DoD component. The Initial Capabilities Document was JROC approved in November 2005 and the AoA was approved in April 2006. The capabilities development document is expected to be JROC approved in FY 2007.

Developers
To be determined.

Landing Craft, Air Cushion (LCAC)

Description
This high-speed, fully amphibious landing craft is capable of carrying a 60-ton payload (75 tons in overload) at speeds in excess of 40 knots and a nominal range of 200 nautical miles. Its ability to ride on a cushion of air allows it to operate directly from the well decks of amphibious warships. Carrying equipment, troops, and supplies, the LCAC launches from the well deck, transits at high speed, traverses the surf zone and lands at a suitable place ashore where it quickly offloads and returns to amphibious shipping for follow-on sorties. LCACs provide Amphibious Task Force commanders flexibility in selecting landing sites, permitting access to more than 70 percent of the world's shores as compared with 17 percent for conventional landing craft. LCACs deliver vehicles and cargo directly onto dry land rather than in the surf zone, and have proved invaluable in support of humanitarian assistance/disaster relief missions, including Tsunami Relief and Hurricane Katrina. LCACs are multi-mission craft that could also conduct alternate missions when outfitted with appropriate mission packages. A Service Life Extension Program (SLEP) to extend hull life from 20 to 30 years for 73 of the 82 active LCACs will be accomplished through FY 2017. Some of the newer craft have been outfitted with C4I (radar and radios) system upgrades prior to entry into SLEP. As part of SLEP, the Navy will incorporate the following life enhancements:

• An open architecture concept, relying on modern COTS equipment that will allow much easier incorporation of later technology changes, such as the precision navigation system and communications systems, fully interoperable with in-service and near-term future joint systems now planned

• Engine upgrades (ETF-40B configuration) that will provide additional power and lift, particularly in hot (100° F and higher) environments, reduced fuel consumption, reduced maintenance needs, and reduced lift footprint

• Refurbishment of the buoyancy box and some of the rotating machinery in order to solve corrosion problems, incorporate hull improvements, and "reset" the fatigue-limit "clock"

• Incorporation of a new (deep) skirt that will reduce drag, increase performance envelope over water and land, and reduce maintenance requirements.

Status
IOC was achieved in 1986. Ninety-one contracts for LCACs were approved through FY 1997, with all 91 craft delivered to the Fleet by the end of 2001. Nine that were in Deep Reduced Operating Status (03ROS) were terminated in FY 2006 for cost reasons, and two are held for research and development. The LCAC SLEP began in late 2000. Five to six SLEPs are planned each year FY 2006-FY 2014, and two SLEPs are planned for FY 2015.

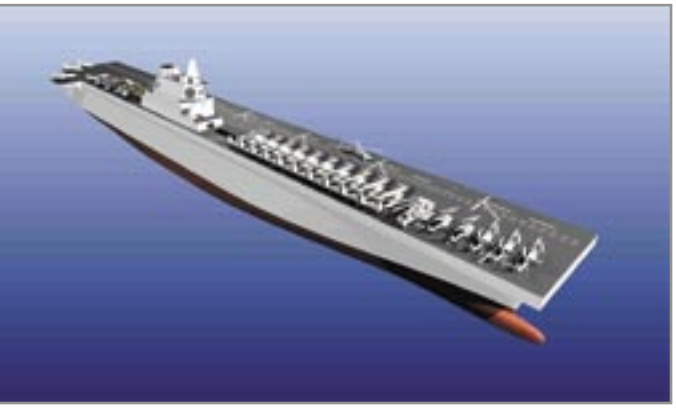
Developers
Textron Marine and Land Systems; New Orleans, Louisiana
Avondale Marine; Gulfport, Mississippi

Seabase To Shore Connector (SSC) LCAC Replacement

Description
The SSC is envisioned to provide high-speed, heavy-lift for over-the-horizon maneuver, surface lift, and shipping. The LCAC Service Life Extension Program (SLEP) is capable of lifting 72 tons (75 in overload) in extreme environmental conditions. The SSC will be designed to lift, at a minimum, what an LCAC SLEP can load. The SSC will also target reduced manning requirements. The program will investigate several options with regard to vessel length and payload capacity, as well as enhanced lift fans and propellers and composite materials technology.

Status
The Initial Capabilities Document was approved in October 2006. RDT&E commenced FY 2005. AoA will be conducted in FY 2007. Delivery of the first craft into the Fleet is scheduled for FY 2016.

Developers
To be determined.



LHA(R) General Purpose Amphibious Assault Ship (Replacement)

Description
The LHA(R) is a new acquisition program that will deliver a class of general-purpose amphibious assault ships. In support of the *Sea Power 21* global concept of operations, the LHA(R) class will provide forward-presence and power-projection capabilities as elements of U.S. expeditionary strike groups and strike forces.

With elements of a Marine landing force, the LHA(R) class will embark, deploy, land, control, support, and operate helicopters, landing craft, and amphibious vehicles for sustained periods. The LHA(R) will also support contingency-response, forcible-entry, and power-projection operations as an integral part of joint, interagency, and multinational maritime expeditionary forces. Based on evolutionary spiral development strategy that leverages evolving technologies and systems, the LHA(R)-class will replace four of the five USS *Tarawa* (LHA 1)-class that begin reaching the end of their expected service lives between 2011 and 2015. LHD 8, the final ship of the USS *Wasp* (LHD 1)-class will replace the first retiring *Tarawa*-class ship and will incorporate a gas turbine propulsion plant and all-electric auxiliaries. The first LHA replacement is being designed as a variant of the LHD 8. This ship will include LHD 8 enhancements and a significant increase in aviation lift, sustainment, and maintenance capabilities; space for a MEU, PHIBGRU, or small-scale JTF staff; a dramatic increase in service life allowances for new-generation Marine Corps systems (MV-22, JSF); and substantial survivability upgrades.

Status

In 1999, the Navy conducted a development of options study that ruled out LHA Service Life Extension as a viable option. The Navy and Joint Staff approved and validated the LHA(R) Mission Needs Statement in March 2001, and OSD (AT&L) authorized Milestone A Acquisition Status and entry into Concept Exploration phase in July 2001. Under OSD guidance, the Navy conducted an analysis of alternatives to determine the best method of replacing the four remaining LHAs. This study, completed in September 2002, evaluated numerous design alternatives, including: (1) repeat LHD 8 with evolutionary modifications; (2) a longer and wider LHD 8 upgraded to operate the larger and heavier new-generation amphibious systems; and (3) several new ship designs spanning a wide range in size and capability. The Navy and Marine Corps leadership determined a modified LHD with greater aviation focus, including aviation facility enhancements in lieu of a well deck, provided the best balance of affordability, timing, and capability. JROC approval was obtained in February 2005 and Milestone B was reached in January 2006. The first LHA(R) was designated LHA 6 by the Under Secretary of the Navy in August 2005 with hull numbers for subsequent ships in the LHA(R) program following sequentially. LHA 6 is planned for a FY 2007 contract award and delivery in FY 2012.

Developers

To be determined.

LHD *Wasp*-Class Amphibious Assault Ship

Description
The USS *Wasp* (LHD 1)-class comprises eight 40,650-ton full-load, multi-purpose amphibious assault ships whose primary mission is to provide embarked commanders with command and control capabilities for sea-based maneuver/assault operations as well as employing elements of a landing force through a combination of helicopters and amphibious vehicles. The *Wasp*-class also has several secondary missions, including power projection and sea control. The LHD 1 ships increase total lift capacity by providing both a flight deck for helicopters and Vertical/Short Take-Off or Landing (V/STOL) aircraft, such as the AV-8B Harrier and the MV-22 Osprey, and a well deck for both air-cushioned and conventional landing craft. Each ship can embark 1,877 troops (surge) and has 125,000 cubic feet of cargo for stores and ammunition and 20,900 square feet for vehicles. Medical facilities include six operating rooms, an intensive-care unit, and a 47-bed ward. LHDs 5-7 are modified variants of the class, and design changes include: increased JP-5 fuel capacity, C4ISR and self-defense improvements, fire-fighting and damage-control enhancements, and Women-at-Sea accommodations. The Navy awarded the LHD 8 construction contract in April 2002. The ship has significant design changes that incorporate gas-turbine (GT) propulsion and all-electric auxiliary equipment. GT propulsion was considered for LHD 5 (keel laid in April 1991), but the technology of the time would have required four GT plants that would have significantly reduced internal volume for other vital needs. Since then, GT power-ratings have increased such that just two GTs are needed to generate the required 70,000 shaft-horsepower (the earlier ships have two steam plants and geared turbines). Otherwise, LHD 8 will be a modified-repeat of LHD 7 (a state-of-the-practice ship), except for changes made necessary because some older systems are no longer available.

Status
Seven LHDs have been delivered to the Fleet. The newest LHD, the USS *Iwo Jima* (LHD 7), was commissioned on 30 June 2001. The eighth ship of the class, USS *Makin Island* (LHD 8) is under contract, and the Navy anticipates delivery of the ship in FY 2008.

Developers
To be determined.

LPD 17 *San Antonio*-Class Amphibious Transport Dock Ship

Description

The USS *San Antonio* (LPD 17)-class is an amphibious transport dock ship optimized for operational flexibility and designed to meet MAGTF lift requirements in the emerging Expeditionary Maneuver Warfare concept of operations. The *San Antonio*-class is 684 feet in length, with a beam of 105 feet, a maximum displacement of 25,000 long tons, and a crew of approximately 360. Four turbocharged diesels with two shafts and two outboard-rotating controllable-pitch propellers generate a sustained speed of 22-plus knots. Other ship characteristics include 25,000 square feet of space for vehicles (more than twice that of the *Austin* (LPD 4)-class), 34,000 cubic feet for cargo, accommodations for approximately 720 troops (800 surge), and a medical facility (24 beds and four operating rooms-two medical and two dental). The aft well deck can launch and recover traditional surface assault craft as well as two landing craft air cushion (LCAC) vehicles, capable of transporting cargo, personnel, Marine vehicles, and tanks, and the Marine Corps' new Expeditionary Fighting Vehicle (EFV). The LPD 17 aviation facilities include a hangar and flight deck (33 percent larger than *Austin*-class) in order to operate and maintain a variety of aircraft, including current and future rotary-wing aircraft. Other advanced features include the Advance Enclosed Mast/Sensor (AEM/S) for reduced signature/sensor maintenance, reduced-signature composite-material enclosed masts, other stealth enhancements, state-of-the-art C4ISR and self-defense systems, a Shipboard Wide-Area Network (SWAN) that will link shipboard systems and embarked Marine Corps platforms, and significant quality of life improvements.

Reducing Total Ownership Costs (TOC) has been and will remain an important factor in the program's efforts. By introducing a variety of new approaches to streamlining the acquisition process and taking advantage of numerous "SmartShip" initiatives to optimize (not simply reduce) manning through focused human-factors engineering and thus enhance operational capabilities, the Navy estimates that it shaved about $4.5 billion from the program's TOC. Manning and human-systems integration issues are absolutely essential, as approximately 40 percent of a ship's life cycle, cradle-to-grave cost, is directly linked to its crew.

With the *Tarawa* (LHA 1)-class, *Wasp* (LHD 1)-class, LHA Replacement [LHA(R)]-class amphibious assault ships, and the 12 LPDs, the Navy has the foundation for lifting both the Marine Expeditionary Brigade Assault Echelons (MEB AE) and to sustain the forward deployments of three Marine Expeditionary Units (special operations capable) (MEU SOC).

Status
The initial contract award to design and build the lead ship of the class was awarded to the Avondale-Bath Alliance in December 1996. A contract award protest was successfully resolved in April 1997. LPD 17 class workload was transferred from Bath Iron Works to Northrop Grumman Ship Systems (NGSS) in June 2002. LPDs 18 through 21 are under construction:

• *San Antonio* (LPD 17) was delivered in July 2005 and was commissioned in January 2006.

• *New Orleans* (LPD 18) started construction in February 2002, and will be delivered in FY 2007.

• *Mesa Verde* (LPD 19) started construction at NGSS Pascagoula in August 2002, and is expected to deliver in FY 2007.

• *Green Bay* (LPD 20) started construction in March 2003 and is expected to deliver in FY 2008.

• *New York* (LPD 21) started construction in March 2004 and is expected to deliver in FY 2009.

• *San Diego* (LPD 22) and Anchorage (LPD 23) contracts were awarded in June 2006.

Contract options exist for *Arlington* (LPD 24) and *Somerset* (LPD 25) and are expected to be exercised in FY 2007 and FY 2008 respectively. LPD 24 and LPD 25 are named to honor the heroes and victims of the 11 September 2001 Pentagon attack and Flight 93 in Pennsylvania.

Developers
Northrop Grumman Ship Systems Avondale Operations; New Orleans, Louisiana
Ingalls Operations; Pascagoula, Mississippi
Raytheon; San Diego, California
Intergraph; Huntsville, Alabama

MPF(F) Maritime Prepositioning Force (Future)

Description
Current MPF ships have limited interoperability with naval shipping and cannot provide direct and continuous sustainment after ship-offload. Today's MPF ships offload at a port or across a beach, and equipment is married with Fly-in Echelon (FIE) personnel and equipment from shore based Marine Expeditionary Units or Brigades (MEUs/MEBs). In order to meet future *Sea Power 21* seabasing needs, SECNAV selected a hybrid MPF(F) squadron on 24 May 2005. The squadron is comprised of two LHA(R)s, 1 LHD, three LMSRs, three T-AKEs, three new design Mobile Landing

Platforms (MLPs) and two legacy Maritime Prepositioning ships. Compared to the current MPF fleet, the MPF(F) squadron will have additional capabilities to satisfy ship-to-objective-maneuver (STOM) and operational maneuver from the sea (OMFTS) mission requirements, including:

• Selective off-load, which will enable Marine Expeditionary Brigades to select equipment tailored for specific STOM and OMFTS missions.

• The ability to form a Maritime Prepositioning Group (MPG) as part of the Sea Base in support of expeditionary and carrier strike group operations.

• The capability to provide joint sustainment in direct support of joint forces tasked with STOM and OMFTS tasks.

• The capability to reconstitute in the Joint Operations Area (JOA) and to redeploy directly to another JOA

• MPF(F)s will provide operational and logistical support from the sea for Marines and joint forces ashore as well as naval forces afloat. Optimizing sea-based capabilities will significantly reduce assured-access and sovereignty challenges by reducing footprint ashore.

MPF(F)s will transform the MPS-supported Marine Expeditionary Brigade from a fighting unit ashore to one that can operate continuously from a sea base without the need to transition support elements to land. MPF(F) will also support rapid reconstitution and redeployment for follow-on missions. MPF(F)'s transformational characteristics include significant improvements in force closure, sustainment, selective offload, command and control, and reconstitution. MPF(F) will be interoperable with current amphibious task force shipping via surface transport (LCAC), underway replenishment stations, and compatible C4I systems. MPF(F) has the potential to support joint operations and will be interoperable with joint forces support capabilities. MPF(F) will transform naval logistics into a seamless and integrated system that will complement current Combat Logistics Forces by providing sea-based logistics to all naval forces. This ability could include cargo trans-shipment from intermodal shipping to other naval ships or ashore. An MPF(F) Squadron when operating as part of an expeditionary strike force provides significant expeditionary force projection from over-the-horizon with the ability to sustain forces ashore and contribute to the throughput and sustainment of additional Joint Forces. MPF(F) will be able to support forcible entry operations as part of an expeditionary strike force, which includes sufficient escort support to adequately mitigate the threat and secure the environment.

Status

The MPF (F) Capabilities Description Document was completed in FY 2006. Squadron Milestone B is anticipated in FY 2008.

Award of the lead ship contract is expected in FY 2009 (with advance procurement in FY 2008). This schedule will provide for a squadron IOC in FY 2016.

Developers
To be determined.

T-AKE Lewis and Clark-Class Dry Cargo and Ammunition Ship

Description
The T-AKE Class Dry Cargo and Ammunition Ship replaces the *Kilauea* (T-AE 26), *Mars* (T-AFS 1), and *Sirius* (T-AFS 8) classes of fleet auxiliaries, all of which are nearing the ends of their service lives. T-AKE provides logistic lift from sources of supply and transfers this cargo at sea to station ships (which serve the combat forces) and other naval forces. As a secondary mission, T-AKE may act in concert with a fleet oiler (T-AO) as a substitute station ship. T-AKE ships are built to commercial standards and crewed by Military Sealift Command civilian mariners, augmented by military personnel as required by mission requirements, such as support cargo supply functions. A Navy aviation detachment or equivalent using contracted commercial helicopters, provide vertical underway replenishment (VERTREP) capability.

Status
Eleven T-AKEs are programmed for the Combat Logistics Force through FY 2008. The lead ship, USNS *Lewis and Clark* (T-AKE 1) was delivered to Military Sealift Command in June 2006. Sacagawea (T-AKE 2) was launched in June 2006 and is scheduled for fleet introduction in early FY 2008. *Alan Shepard* (T-AKE 3), *Richard E. Byrd* (T-AKE 4), *Robert E. Peary* (T-AKE 5), and T-AKE 6 (yet to be named) are currently in the early stages of construction. In addition to the eleven CLF T-AKEs, three follow-on vessels are envisioned as part of the Maritime Prepositioning Force (Future) squadron.

Developers
National Steel and Shipbuilding Company, San Diego, California

Equipment and Material

Improved Navy Lighterage System (INLS)

Description
The NLS is a new generation modular mono hull barge system used to offload rolling stock and cargo from Maritime Prepositioning Force and Strategic Sealift Ships over the beach or to an unimproved pier in the event more robust port facilities are denied, degraded, or unavailable. INLS replaces the aging legacy Navy Lighterage (NL) system. The system, which consists of powered and non-powered sections, can be configured for a variety of functions. Major variations and components include warping tugs, causeway ferries, a floating causeway pier, and a roll-on/roll-off discharge facility or RRDF. INLS can support both lift on/lift off (LO/LO) and roll-on/roll-off (RO/RO) operations in near shore operations. INLS is also envisioned to support legacy vessels of the MPF (Future) squadron. The systems improved sea-keeping, water jet propulsion, and cargo movement capabilities far surpass the current NL in speed, maneuverability, cargo throughput, and crew safety.

Status
INLS low-rate initial production assets were delivered in October 2005 and developmental testing was conducted in March 2006 with the final OPEVAL completing in May 2006. INLS is currently in full-rate production incorporating several improvements and modifications resulting from developmental testing and recommended by the OPEVAL. Follow-On Test and Evaluation, and Validation and Verification of changes will continue throughout the full-rate production, which will complete in FY 2008. INLS will commence fielding aboard MPF in FY 2007 during MPF Maintenance Cycle Nine.

Developers
Marinette Marine; Marinette, Wisconsin
Middle Trades, INC; Charleston, South Carolina
Oldenburg Lakeshore, INC; Rhinelander, Wisconsin

Maritime Prepositioning Force Utility Boat (MPF UB)

Description
MPF UB is a commercial design utility craft used to support personnel and light equipment movement and logistics during MPF offload operations. The MPF UB will replace most of the existing LCM-8s aboard MPF ships and at each Assault Craft Unit (ACU). Additionally, the MPF UB can provide waterborne force protection as well as limited medical evacuation support in a protected environment. The craft, powered by twin diesel engines and water

jet propulsion, is capable of speeds in excess of 25 knots over a 300nm range in sea state 2-plus. A bow ramp facilitates embarking and discharging personnel over a ramp, low pier, or quay.

Status
The first MPF UB was delivered to ACU-1 in February 2006 and the first MPS ship, *SS PLESS*, received the MPF UB in September 2006. A total of 18 craft are programmed for procurement through FY 2008.

Developers
Kvichak Marine; Seattle, Washington

Naval Mobile Construction Battalion (NMCB) Tables of Allowance (ToA)

Description
Naval Construction Force elements provide engineering and combat construction support to MAGTF. In support of Sea Strike and Sea Basing missions, the Navy/Marine Corps Team projects power from the sea with a rapid flow of maneuver forces ashore, using roads, expeditionary airfields, force-protection structures, intermediate staging bases, and advanced logistics bases. Forward deployment of NMCBs enables the surge of task-tailored engineer forces and equipment sets to enhance the MAGTF and other naval and joint forces on land. In operations other than war, forward-deployed NMCBs hone construction skills through humanitarian assistance and disaster-recovery operations, participate in foreign engagement exercises, and complete construction projects that support sustainment, restoration, and modernization of the Navy's forward bases and facilities.

Status
The Navy has developed a long-range plan to recapitalize the Tables of Allowance (ToA) of all Seabee units. The initial priority is to correct existing inventory deficiencies and replace aging tools and equipment that are no longer parts supportable. During the next several years, the ToAs will be outfitted with modern and recapitalized tactical vehicles, construction and maintenance equipment, communications gear, infantry items, and field support equipment.

Developers
Multiple sources

Submarine Escape and Rescue

Submarine Escape and Immersion Equipment (SEIE)

Description
To facilitate emergency escape from depths down to 600 feet, all submarines are being outfitted with the Mk-10 Submarine Escape Immersion Equipment (SEIE) suit and improved hatch operating systems. In addition to increasing the depth capabilities of escape, the suit provides thermal protection and individual life rafts for surface abandonment or escape.

Status
Installation is complete for the USS *Los Angeles* (SSN-688) class while the installations for the USS *Ohio* (SNN-726) and USS *Seawolf* (SSN-21)-class submarines have just begun. The USS *Virginia* (SSN-774)-class is receiving SEIE suits upon initial outfitting following construction.

Developers
Beaufort Air-Sea Equipment; Merseyside, United Kingdom
Northrop Grumman Ship Systems; Pascagoula, Mississippi

Survivability

Description
Today's Submariners use passive means to remove carbon dioxide from a disabled submarine's atmosphere, enabling survival up to seven days. Current development includes improving passive scrubbing capability and more accurately monitoring a disabled submarines atmosphere.

Status
Installation of passive scrubbing curtains onboard all submarines is nearing completion. Procurement and installation of SUB MKI-IP hyperbaric analyzers onboard all submarines will be completed in FY 2007.

Developers
Battelle Memorial Institute; Columbus, Ohio
Analox Sensor Technology Ltd; Stokesley, United Kingdom

Rescue (DSRV, SRC, SRDRS)

Description

The Navy's Deep Submergence Rescue Vehicle (DSRV) and Submarine Rescue Chamber (SRC) provide the service's current capabilities for submarine rescue. These systems are designed for quick deployment in the event of a submarine accident. They are transportable by truck, aircraft, ship, and, for the DSRV, by specially configured "mother" submarines. The Navy is developing a new rescue system called the Submarine Rescue Diving Recompression System (SRDRS). SRDRS is a manned submersible capable of rapid, worldwide deployment on vessels of opportunity. The SRDRS overcomes a significant deficiency of current systems enabling personnel transfer under pressure and decompression for submarine disaster survivors. SRDRS will be a government-owned government/contractor-operated system, and will provide increased capability at reduced costs compared to legacy rescue systems.

Status

Production on rescue capable items for SRDRS nears completion, with factory testing set to begin in early 2007. The SRDRS is scheduled to be rescue-ready to replace the DSRV in FY 2007, with a transfer under pressure capability introduced in FY 2011.

Developers

OceanWorks International; Vancouver, California
Oceaneering International; Upper Marlboro, Maryland
Southwest Research Institute; San Antonio, Texas
Caley Ocean Systems; Glasgow, Scotland, United Kingdom

FORCENet

Joint Service/Navy-Wide Systems

Advanced Tactical Data Link Systems (ATDLS)

Description

The ATDLS program develops, fields, and supports joint and coalition Tactical Data Link (TDL) capabilities. These joint TDLS include terminals, gateways, networks, and support initiatives that improve TDL connectivity, promote equipment commonality and interoperability, and provide training and fleet support. Link-11 is used by Navy, Air Force, Army, Marine Corps, and allied ships and aircraft, many of which are also equipped with Link-16. In accordance with the Joint Tactical Data Link Management Plan (JTDLMP), Link-11, which uses the M-series message standard, is scheduled to be shut down no later than 2015. Link-16, which uses the J-series message standard, has been designated as the DoD primary TDL. The Navy is implementing Link-16 in most of its link-capable platforms. The Joint Tactical Enterprise Services Migration Plan (JTMP) will replace the JTDLMP. The JTMP is a plan to migrate from numerous stovepipe non-interoperable tactical data links to a Net-Centric, Open Architecture, IP-based, low latency, joint family of TDL message standards providing access to Tactical Data Enterprise Services and the Global Information Grid. As the JTDLMP approved replacement for Link-11, Link-22 is a multi-national development effort that will use the J-Series message standard. Major supported efforts are:

• Terminals: Joint Tactical Information Distribution System (JTIDS), Multifunctional Information Distribution System (MIDS) Low Volume Terminal (LVT), MIDS Joint Tactical Radio System (JTRS), and the Common Shipboard Data Terminal Set (CSDTS)

• Gateways: Command and Control Processor (C2P), Common Data Link Management System (CDLMS), Next Generation C2P, and Common Link Integration Processing (CLIP)

• Support Initiatives: Joint Interface Control Officer (JICO) Support System (JSS), Dynamic Network Management (DNM).

These capabilities allow more effective employment of fleet units by improving timeliness, accuracy, and content of tactical data transfer.

Status

See following FORCENet program descriptions on pages 134-177.

Developers
Data Link Solutions (DLS); Cedar Rapids, Iowa
ViaSat Inc.; Carlsbad, California
Advanced Programming Concepts; Austin, Texas
BAE Systems; Wayne, New Jersey

Automatic Identification System (AIS)

Description
The AIS is a commercially available shipboard broadcast Very High Frequency (VHF) maritime band transponder system capable of sending and receiving ship information, including Navigation Identification, and Cargo. AIS is mandated by the International Maritime Organization (IMO) for all merchant vessels over 300 tons. Warships are exempt from this requirement. AIS significantly increases the Navy's and allied nations ability to distinguish between normal and suspicious merchant ships headed towards U.S. and allied ports. Navy warships using AIS have observed dramatic increases in situational awareness, ship safety and intelligence gathering. In 2005, CNO and the Fleet Identified AIS as an urgent Global War on Terror/Maritime Domain Awareness capability and directed fielding of stand-alone AIS on all warships by FY 2006 and fielding integrated AIS in FY 2007-11. To date, 150 Phase 1 (Stand-alone AIS) and 8 Phase 2 (Machine-to-machine AIS data integration with GCCS-M) have been installed. Installations planned for FY 2007 include all surface units and deploying submarines. Navy is planning to install AIS aboard E-2C, P-3C and SH-60 aircraft.

Status
AIS received new start authorization in December 2005. ASNRDA designated AIS as a Rapid Deployment Capability on 24 January 2006. AIS will transition to a program of record in FY 2008.

Developers
L3 Communications; Orlando, Florida
Anteon; San Diego, California
Northrop Grumman; San Diego, California

Automated Digital Network System (ADNS)

Description
The ADNS is the Tactical Internet Protocol (IP) Routing and Switching system for all Wide Area Network (WAN) IP services which connect afloat units to the various global shore sites. It provides ship and shore Internet Protocol (IP) connectivity and promotes the efficient use of available satellite and line of sight

communications bandwidth. ADNS is engaged in converging all voice, video, and data communications between ship and shore to an IP medium taking full advantage of all radio frequency means aboard ships to transmit data efficiently. Specifically, it automates the routing and switching of tactical and strategic C4I data via Transmission Control Protocol/Internet Protocol (TCP/IP) networks linking deployed expeditionary and strike group units with each other and with the Defense Information Systems Network (DISN) ashore. ADNS uses Commercial Off-the-Shelf (COTS) and Non-Developmental Item (NDI) Joint Tactical Architecture (JTA)-compliant hardware (routers, processors, and switches), and commercial-compliant software in a standardized, scalable, shock-qualified rack design.

Status

Current FYDP plans include replacing all currently deployed systems with ADNS Systems capable of meeting Net-Centric, FORCENet, and future DoD Initiatives. This will be accomplished in accordance with the fleet commanders' coordinated SHIPMAIN process. Fielding plans that began in FY 2005 include installation of ADNS Increment II. In FY 2006, ADNS Increment IIa was added to provide additional capability to Force level ships only. Increment III will be installed in FY 2008 with a planned IOC for late FY 2008 or early FY 2009. Increment III, in alignment with the Tactical Switching program, will field only two shore locations: NCTAMS lant and pac (RNOSC East and West). Increment II, IIa, and III will replace End of Life System Hardware, eliminate the current 2 Mbps IP Throughput bandwidth bottleneck, converge all ships voice, video, and data on a dual stack IPv4/IPv6, Cipher text, IP core network architecture.

Developers

SPAWAR Systems Center Code 2631; San Jose, California
Science Applications International Corporation; Arlington, Virginia
Cisco; San Jose, California

Base Level Information Infrastructure (BLII)

Description

BLII is the program of record that modernizes IT facilities at 16 OCONUS navy bases, stations, and headquarters. It installs new, or upgrades existing infrastructure to provide state-of-the-art IT capability. Further, the program installs the hardware, software, and enterprise management tools to enable a fully integrated, interoperable, and secure IT network for rapid and reliable transfer of data, voice, and video. The program also replaces or upgrades obsolete telephone switches at 145 CONUS and OCONUS locations. Major functional areas of BLII are:

OCONUS IT Infrastructure Modernization:

• Installs/modernizes base and building cable plants; WAN, BAN, and LAN electronics; information assurance; network management; configuration management; and asset management capabilities

• Provides engineering and operations expertise at the IT Service Centers and the IT Outreach Centers

• Installs and sustains system hardware, software, and related training

OCONUS Force Protection (IT):

• Installs/modernizes OCONUS pier IT infrastructure to ISNS standards (equal to or better capability pier-side as ships had at sea)

• Provides engineering, operations and maintenance support to the newly installed IT infrastructure

• Expands SIPRNET capability at OCONUS locations

Naval Network Warfare Command (NNWC) Telephone Switch Replacement/Modernization:

• Replaces obsolete telephone switches and upgrades firmware and software on a progressive schedule to ensure compliance with JCS directives and the recently enacted Public Law 107-314 at the 145 NNWC telephone switch locations that service our forward deployed OCONUS and CONUS support forces

• Modernizes telephone switch cable plants

Status

The backbone phase of the OCONUS IT infrastructure modernization is rapidly coming to conclusion at the 16 designated overseas fleet concentration centers. The next major phase of the OCONUS IT modernization is to bring users to the new physical infrastructure followed by the migration of these users to the new OCONUS enterprise network. Funding is in place to continue this evolution to include technical upgrades and technology insertion through FY 2013. The replacement and upgrade of the Navy's telephone switches is accomplished on a progressive schedule to meet the OSD/Joint Staff-mandated timeframe.

Developers

Navy policy is to procure only hardware and software from the DISAJITC tested/certified/interoperable "Approved Products List". All hardware and software procured and installed in conjunction with the BLII program of record is under the cognizance of PEO EIS. CNO N6F3, NETWARCOM, and the PMW maintain close synchronization in the requirements validation, acquisition, installation, and logistics process.

Command and Control Processor (C2P)

Description
The C2P serves as the interface and data translator between the surface platform's Combat Direction System (CDS) and the Tactical Data Links (TDL). It is considered a gateway as described in the ATDLs discussion above. It is the data forwarder between Links-11 and 16. In 1984, implementation of JTIDS/Link-16 based CDSs commenced with the Advanced Combat Direction System (ACDS) Model 5. The ACDS Model 5 contract had an option for development of a C2P to provide the functionality of the TDL Communication Processor. With this capability, C2P serves as a gateway to connect a Link-16 network to a legacy Link-11 network. C2P Model 4 successfully completed OPEVAL in a combined test with Link-16 in FY 1994. C2P Model 5 successfully completed OPEVAL in FY 2000. The approaching obsolescence of the C2P computer brought about the need to identify a suitable hardware set to re-host the functionality of the C2P. As a practical and cost-effective option, the C2P re-host initiative was joined with another initiative that encompassed the concept of co-locating multiple tactical link management, coordination, and monitoring in a single host.

Status
The C2P is fully fielded with the capability being re-hosted as software within the Common Data Link Management System and Next Generation C2P.

Developers
GSA/Anteon; Fairfax, Virginia
DRS Inc.; Wyndmoor, Pennsylvania

Combined Enterprise Regional Information Exchange System Maritime (CENTRIXS-M)

Description
The CENTRIXS-M is a web-centric GOTS and COTS based global network that permits multinational information sharing. CENTRIXS-M support coalition, Allied, and Joint interoperability and information exchange by providing email, web services, collaboration, and products such as Global Command and Control System Integrated Imagery and Intelligence (GCCS-I3), components for the Common Operational Picture (COP), and Common Intelligence Picture (CIP). In addition, it enables ship-to-ship and ship-to-shore Web replication, secure e-mail, chat communications over SATCOM with allied/coalition partners. CENTRIXS-M also provides a ship-to-shore SATCOM IP path to complement existing ship-to-ship HF e-mail capabilities. The network infrastruc-

ture is implemented by using a combination of network switches, routers, crypto, servers, PCs, and commercial networks technologies. CENTRIXS supports seven different enclaves available to the warfighter: CENTRIXS Four Eyes (AUSTRALIA/CANADA/U.K./U.S.); CENTRIXS Japan (J); CENTRIXS Korea (K); NATO Initial Data Transfer System (NIDTS); Global Counter Terrorism Task Force (GCTF); Combined Naval Forces CENTCOM (CNFC); and Multi Coalition Forces Iraq (MCFI). Currently, the Pacific Region Network Operations Center (PRNOC) is the only network hub for all CENTRIXS connectivity. CENTCOM has directed that all ships deploying to NAVCENT AOR have CENTRIXS capability.

Status

CENTRIXS-M became a program of record first quarter FY 2006. Milestone C for Inc 1 is scheduled for second quarter FY 2007. Milestone B for Inc 2 is scheduled for second quarter FY 2009. Currently, 143 out of 157 Navy ships have CENTRIXS-M connectivity. IOC for Inc 1 is fourth quarter FY 2007, Inc 2 to be determined. FOC for Inc 1 is fourth quarter FY 2018 if Inc 2 is not funded.

Developers

Hardware for procurement and development of ISNS is under the cognizance of PEO C4I/Space PMW 160 as well as OPNAV (N6). These organizations work together to identify and implement the latest technologies to ensure proper implementation into the program. Engineering, development, integration, installation, training, and life cycle support will be accomplished through Navy and DoD activities.

Common Data Link Management System (CDLMS)

Description

The CDLMS initiative extends the functionality of the Command and Control Processor by consolidating several functions previously performed by separate systems or subsystems, and providing improved Human Machine Interface (HMI) and Link maintenance. CDLMS also incorporates the Link Monitoring System (LMS) along with supporting the initial development phase of the Common Shipboard Data Terminal Set (CSDTS). The CSDTS initiative provides the next generation Link-11 data terminal replacing the legacy Link-11 terminal hardware while incorporating Multi-Frequency Link-11 (MFL), Satellite Link-11, and supporting the initial Dual Net Link-11. Re-hosting the C2P within CDLMS provides the same functionality in COTS hardware, namely the UYQ-70 console, which makes the system easier and less expensive to upgrade. The CDLMS integrates the CSDTS and C2P (Rehost) in a set of Versitile Module Eurocard (VME) cards to provide consolidated displays and controls to monitor multi-TDL networks simultaneously. The CDLMS/C2P(R) program

has fielded the USQ-86 (V), consisting primarily of an UYQ-70 EPS housing four VME chassis. Three of these are populated with VME card sets for the following: C2P(R), CSDTS, and the Link Management/Monitoring Component. This hardware configuration supports the transformation to Next Generation Command and Control Processor (NGC2P), which will introduce the Beyond Line of Sight Capabilities Joint Range Extension (JRE) and Link 22.

Status
CDLMS has successfully completed Aegis and SSDS Combat System Integration and Test (CSIT) and is currently being installed. CSDTS implementation is ongoing, enabled by, but separate from, CDLMS/C2P(R). NGC2P achieved IOC in FY 2005. It is currently scheduled to complete testing and be approved for full-rate production in early FY 2008.

Developers
GSA/Anteon; Fairfax, Virginia
DRS Inc.; Wyndmoor, Pennsylvania

Common Link Integration Processing (CLIP)

Description
The U.S. Navy and Air Force are collaborating on the CLIP initiative. CLIP is envisioned as an open architecture software-based common tactical message processing and integration capability with applications across various military platforms and installations, including air, surface, C2 shore sites, and ground-based tactical units. A chief objective is to provide greater interoperability and reduce implementation cost. CLIP will be an evolutionary spiral development process with functionality specified at each delivery point to match platform TDL requirements. It will provide the interface to all the various communication systems including current terminals and radios as well as those under development such as JTRS. It will act as a gateway providing translations and data forwarding to legacy systems and be the primary interface to any host system (i.e., combat). CLIP is envisioned to be primarily software that can reside on any operating system or hardware.

Status
A CLIP MOA between PEO-C4I and Space and Air Force Electronic Systems Center was signed in August 2003. All acquisition program documentation for Milestone B is complete and the program received Milestone B approval by ASN RD&A in May 2005. DDG 1000 is being targeted as Navy lead platform. Contract was awarded to Northrop Grumman in June 2005. A successful critical design review was completed October 2006.

Developers
Northrop Grumman; Reston, Virginia

Commercial Satellite Communications

Description
The Commercial Wideband Satellite Program (CWSP) formerly known as Challenge Athena includes a full duplex, high data-rate satellite terminal (AN/WSC-8) and architecture that operates in the C-band spectrum up to 2.048 Mbps. CWSP is a FORCEnet enabler which provides for voice, video, data, and imagery circuit requirements. It supports Command Ships (LCC), Aircraft Carriers (CV/CVN), Amphibious Ships (LHA/LHD/LPD) and other selected ships, including hospital ships (T-AH) and submarine tenders (AS). Terminals are also installed at schoolhouse locations in San Diego and Norfolk. Examples of specific communications circuits that are provided include: Distributed Common Ground Surface System-Navy (DCGS-N), Video Tele-Conferencing (VTC), Video Information Exchange system (VIXS), Video Tele-Medicine (VTM), Video Tele-Training (VTT), Afloat Personal Telephone Service (APTS), Integrated Digital Switching Network (IDSN) for voice/telephone, Secret/Unclassified Internet Protocol Router Networks (SIPRNET/NIPRNET), and Joint Worldwide Intelligence Communications System (JWICS). The CWSP terminal uses commercial satellite connectivity and COTS/NDI Equipment. It has transitioned from augmentation to surge, and in recent years has become an integral part of Navy's SATCOM architecture because of the existing and extremely overburdened military satellite communications systems.

Status
The majority of CWSP terminals procured (40 total) are currently installed on 28 ships. Two additional terminals are to be installed on a new construction CVN 77 and LPD 18 and LPD 19. Currently there is no funding for CWSP after FY 2009 at which time the AN/WSC-8 terminals will be placed in inactive equipment maintenance (IEM) status. The Commercial Broadband Satellite Program (CBSP) is scheduled to replace CWSP.

Developers
Harris Corporation

Commercial Broadband Satellite Program (CBSP)

Description
CBSP is scheduled to replace both CWSP and INMARSAT B HSD in the fleet to augment bandwidth not otherwise available from MILSATCOM.

Status
The competitive acquisition process (PEO C4I PMW170) has begun with award date expected in the June 2007 timeframe. The Rapid Development Capability (RDC) process is being used to accelerate procurement and installation on 44 ships by the end of FY 2009. Current funding supports 104 ships across the FYDP (FY 2008-FY 2013). The ultimate objective requires a POM-10 decision for 195 ships (total) across the FYDP FY 2008-FY 2013.

Developer
To be determined.

Deployable Joint Command and Control Capability (DJC2)

Description
The DJC2 is an ACAT-1, joint DoD transformation initiative, with Navy as the lead component designed to provide a standardized deployable Command and Control (C2) capability for Combatant Commanders (COCOMs) and Joint Force Commanders. Fielding of DJC2 will greatly reduce the ad hoc nature of deploying Joint Task Force C2. Real world events such as the such as the Tsunami, Pakistan earthquake, Hurricane Katrina, and the Lebanon evacuation make apparent the need for a robust rapidly deployable Joint Task Force capability. DJC2 supports the Navy Strategic Plan by extending the Joint Sea Base ashore, and supporting rapid, dynamic joint operations. DJC2 will provide the deployable Joint Force Commanders with a level of C4I application integration that is not currently available, and provides the Joint Task Force Commander scalable configurations of Comms, C2, generators, shelter, HVAC, and collaboration tools across up to five security enclaves. DJC2 is built upon the Joint Global Command and Control System (GCCS-J), the Joint Forces Command developed Collaborative Information Environment (CIE) toolkit and existing joint and service C2 programs (especially the GCCS family of systems), and lessons learned from Operation Enduring Freedom and Operation Iraqi Freedom, to equip the Combatant Commanders and Joint Force Commanders with a tested C2 system that is:

• Horizontally and vertically integrated across all levels of command

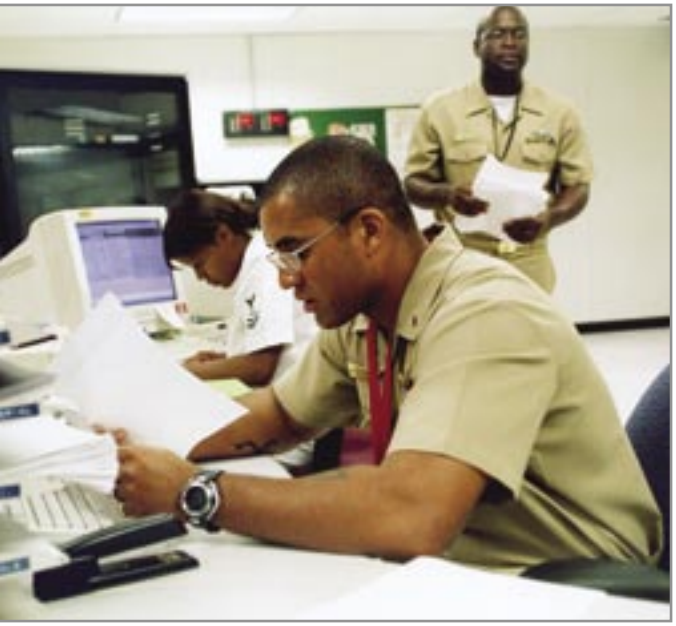
• Interoperable across joint, coalition, interagency, Non-Governmental Organization/Private Volunteer Organization (NGO/PVO) realms

• Robust, scalable, and rapidly deployable, including an en-route capability

• Spiral development and fielding of evolving technology will help to meet Combatant Commanders and Joint Task Force requirements.

Status
The Capability Production Document was approved by the JROC in November 2004. The Navy acquired the developmental experimentation suite for Joint Forces Command in FY 2004. The initial DJC2 operational test unit was delivered to the U.S. Southern Command in September 2005. The second DJC2 operational test unit was used to support Hurricane Katrina disaster relief operations in New Orleans, Louisiana. The Multi-Service Operational Test and Evaluation (MOT&E) was completed in June 2006. Expect DJC2 to be approved to field a total of six operational DJC2 systems to Southern Command, European Command, Pacific Command and Joint Forces Command in CY 2007. DJC2 has been funded to procure and field Rapid Response Kits and everything over internet protocol in CY 2007-2008 as part of the DJC2 system which will insert new commercial technologies that will shrink the equipment footprint and make for a much more flexible system. The 2005 QDR changed the direction of the Deployable Joint Task Force HQ concept by assigning responsibility to man/train/equip deployable Joint Task Force HQs to Service 2-star/3-star Headquarters (vice Combatant Commanders Standing Joint Task Force HQs). DoD is working on details of how to implement this change. In 2006, based on the QDR, OSD decided to limit the DJC2 program to the fielding and sustainment of the six Incr 1 Systems.

Developers
L3; Panama City, Florida
Lockheed Martin; Panama City, Florida
Northrup Grumman; Arlington, Virginia
BMP COE; College Park, Virginia



Defense Messaging System (DMS)

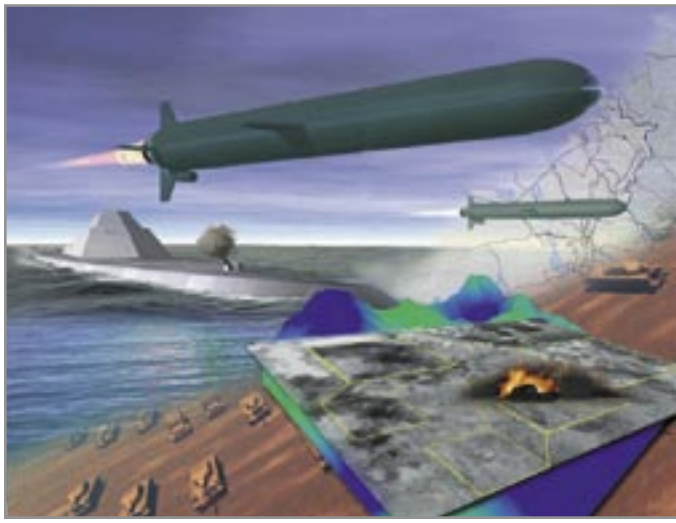
Description
The DMS initiative is an OSD-mandated program designed to eliminate the multitude of expensive "stovepipe" legacy record messaging systems that provide organizational and individual message traffic between operational units. The DMS architecture has been derived using the Multi-command Required Operational Capability (MROC) requirements and has been targeted to provide the armed services and agencies with a high assurance messaging capability. The DMS provides messaging, directory, and management services.

Status
Current DoD implementation of DMS closed the DMS Transitional Hubs (DTHs) for GENSER on 30 September 2003 and for Emergency Action Message (EAM) messaging on 22 February 2004. Navy is transitioning to a Web-based interface known as the DMS Expanded Boundry Solution (DEBS). This transition

eliminates costly client/server architecture and consolidates the DMS service providers from 21 sites down to two. The transition to DEBS will be completed in 2008 for DMS Ashore and 2011 for DMS Afloat. Funding is provided from the Tactical Messaging Program.

Developers
Lockheed Martin; Manassas, Virginia

Distributed Common Ground System-Navy (DCGS-N)



Description
DCGS-N is the Navy's Intelligence, Surveillance, Reconnaissance, and Targeting (ISR&T) processing and exploitation program that will support all levels of the command and control decision process. It will merge ISR&T, mission planning, and situational awareness functions into a Web-enabled, network-centric, joint-interoperable architecture. DCGS-N will support the Navy's command and control tiers of numbered fleet command ships and ashore command centers (Tier 1); carrier strike groups/expeditionary strike groups (Tier 2); and unit level strike platforms (Tier 3). Each tier will have a scalable set of DCGS-N capabilities to support its assigned roles and missions. DCGS-N will utilize network-centric, multi-intelligence processing and exploitation to support the Task, Post, Process, Use (TPPU) process for the Commander Joint Task Force and the maritime warfighter. Leveraging existing GCCS-M, JSIPS-N, and TES-N programs, DCGS-N includes timely interfaces to national, joint, theater, and organic sensors. The aim points generated by DCGS-N will be provided to a variety of air, surface, and sub-surface launched precision guided weapons systems. DCGS-N will be interoperable with the DCGS elements of the other services through the use of the DCGS Integration Backbone (DIB) as the foundation of the DCGS-N architecture.

Status
Between FY 2008 and FY 2012, DCGS-N will be installed on aircraft carriers, large-deck amphibious ships, fleet command ships, and at designated shore-based reach-back support sites. U.S. Fleet Forces Command and OPNAV are working together to determine the appropriate afloat/shore-based architecture and fielding plan that will meet fleet ISR exploitation and targeting requirements.

Developers
Northrop Grumman; Linthicum, Maryland
Raytheon; Garland, Texas
SAIC; Maryland
BAE Systems; Ranchero Bernardo, California

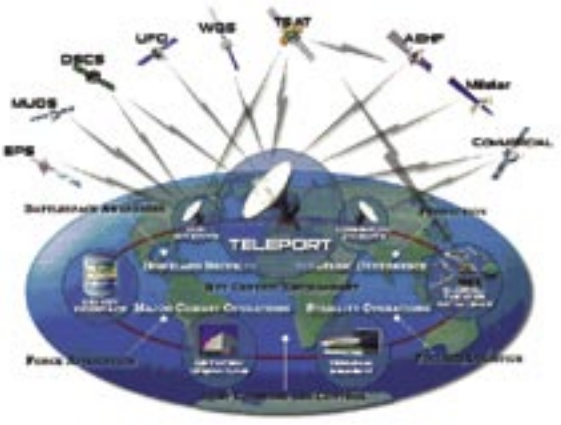
Dynamic Network Management (DNM)

Description
DNM will effectively increase Link 16 Network throughput and provide the warfighter greater flexibility in the use of Link-16. DNM will facilitate automated net entry/exit of additional platforms in the future, including smart weapons with a weapons data link, and will provide a real-time capability to modify Link-16 network parameters with existing messages to meet evolving changes in the theater. DNM will also enable capabilities such as IP over Link-16, variable update and throughput rates, monitoring and analyzing of real-time network loading, and executing stacked and multi-net operations. DNM is essential to reducing Link-16 network saturation and is an enabler for the JICO Support System (JSS). It also provides essential support for time critical targeting and time critical strike. DNM includes the following capabilities:

- **Time Slot Reallocation (TSR)**
- **Dynamic Multi-netting**
- [a] **Network Control Technology (NCT) used by the JICO**
- [a] **SHUMA — a new contention access capability.**

Status
The DNM program enables a fully tested and interoperable version of the platform's host system, known as the Joint Host Demand Algorithm (JHDA) to support the Time Slot Reallocation (TSR) protocol, implemented and fielded in the shipboard Command and Control Processor (C2P) in early FY 2006 and will be fielded in E-2Cs in May 2007. TSR is also being expanded to enable further use of it on the Link 16 network (TSR RC) for other users and applications. A random access mode that provides a nodeless, flexible, and scalable means of adapting the network to rapid changes in topology and message traffic conditions, known as SHUMA, is being lab tested. Both SHUMA and TSR RC will enable fully ad-hoc, dynamic network operations on Link 16.

Developers
SPAWARSYSCEN; San Diego, California
Northrop Grumman; San Diego, California



DoD Teleport

Description
The DoD Teleport links the space segment with the shore infrastructure and provides tactical users a worldwide communications interface to the Global Information Grid. Through multiple radio frequency media (military and commercial bands), Teleport provides inter-theater reach back into the Defense Information Systems Network (DISN) and service C4I systems, as well as in-

tra-theater communications support for tactical users. Teleport consists of six primary sites and one secondary site. The Navy operates and maintains Teleports at Wahiawa, Hawaii; Northwest, Virginia; Lago Patria, Italy; and Bahrain. Non-Navy Teleports sites are located at Fort Buckner, Okinawa, Japan; Camp Roberts, California; and Landstuhl/Ramstein, Germany.

Status

DoD Teleport is an Acquisition Category (ACAT) 1AM program with OSD (NII) as the Milestone Decision Authority (MDA). Acquisition Decision Memorandum (ADM) 5 May 2000 established DISA as the Executive Agent and Joint Requirements Oversight Council Memorandum (JROCM) 044-01 of March 2001 established Service Teleport site responsibility as well as Navy as the Teleport Requirements Sponsor. Teleport entered Milestone C for Generation One in July 2002 and reached IOC 1 with X, C, and Ku-bands in April 2004. In July 2004, the JROC approved the DoD Teleport Operational Requirements Document (ORD) Generation Two update, which supported a Milestone B decision in 2006. Teleport Generation Two will provide military Ka-band and initial network-centric IP capability. The Capabilities Development Document (CDD) for Teleport Generation Three (FY 2008-FY 2012) which adds Advanced EHF (AEHF), Wideband Global Satellite (WGS) System, interface to the Mobile User Objective System (MUOS), and Internet Protocol (IP)/Net-Centric capability, has been approved through the Net Centric Functional Capabilities Board (NC FCB).

Developers

Arrowhead; Alexandria, Virginia
ViaSat; Carlsbad, California
Raytheon; St. Petersburg, Florida
ITT; Colorado Springs, Colorado

Global Broadcast Service (GBS)

Description

The GBS can augment and interface with other communications systems to provide a virtual two-way network to deliver a high-speed, one-way flow of high-volume information disseminated quickly by broadcast to proliferated, low-echelon, geographically dispersed users supporting situational awareness, weapons targeting, intelligence, and homeland defensive operations. GBS can support military operations with U.S. allies or coalition forces and non-DoD governmental organizations. GBS will revolutionize communications with increased capacity, faster delivery of data, near-real-time receipt of imagery and data to the warfighter, and reduced over-subscription of current MILSATCOM systems.

Status

The Navy is fielding receive-suites on carriers, large-deck amphibious ships, command ships, guided missile submarines (SSGN), and half of the nuclear-powered attack submarines (SSN). Guided missile cruisers, destroyers, and strategic missile submarines are required, but not funded. Transition to an IP-based enhanced architecture should be completed in FY 2007. The enhanced architecture nearly doubles worldwide capacity with potentially eight times more coverage. Afloat-platform capability will have up to six multiple-receive channels (each up to 24 Mbps) and support additional security enclaves (each of 70 Mbps). Compartmented enclaves such as a top secret or allied broadcast are not funded. Within bandwidth there are no constraints on the number of concurrent video stream products received for viewing on computer workstations across attached networks. The enhanced architecture permits improved sharing and reallocation of broadcast coverage and bandwidth between, users, information product, media types, and security levels. The system is more queue driven, priority based rather than scheduled based. On the large, more capable ships or fixed shore platforms, the enhanced architecture will also permit multiple satellite receive capability, including UFO and WGS or commercial satellites, concurrently.

In January 2005, DoD approved new and maturing operational requirements defining spiral development, including automated satellite spot beam sharing (important naval requirement), two-way transmit receive suites, better management of new space segment resources, enhanced GIG integration, suitcase and rucksack portable receive suites, communications-on-the-move ground mobile receive suites, terrestrial wireless rebroadcast receive suites, global system-wide management and content sharing, flexible system restoration, and bandwidth efficiency metric reporting for better planning and system allocation planning.

Developers
U.S. Air Force, Space and Missile Systems Center/Raytheon; El Segundo, California

Global Command and Control System—Maritime (GCCS-M)

Description
As the naval implementation of the GCCS, GCCS-M is the OSD-designated Command and Control (C2) migration system for the Navy. GCCS-M supports multiple warfighting and intelligence missions for commanders at every echelon, in all afloat, ashore, and tactical naval environments, and for joint, coalition, and allied forces. GCCS-M meets the joint and service requirements for a single, integrated, scalable C2 system that receives, displays, cor-

relates, fuses, and maintains geo-locational track information on friendly, hostile, and neutral land, sea, and air forces and integrates it with available intelligence and environmental information. Key capabilities include: multi-source information management, display, and dissemination through extensive communications interfaces; multi-source data fusion and analysis/decision-making tools; and force coordination. More than 56 joint and naval systems interface with GCCS-M to exchange data.

The GCCS-M program was designated an ACAT-1AC program in March 2001. GCCS-M Version 3.1.2.1 was released to the fleet in FY 2001, and included major enhancements to GCCS-M's intelligence and warfighting software applications. Version 3.1.2.1 reduces time-latency problems with Common Operational Picture (COP) track data, and enables high-data-rate communication-configured ships and shore headquarters to exchange COP track information via a faster IP transmission method. GCCS-M 4.0 completed Operational Test on USS *Nimitz* (CVN 68), COMPACFLT HQ, and COMSUBPAC HQ and was approved for full-rate production in FY 2005. GCCS-M 4.0 is a significant hardware, software and capability upgrade to the circa-1998 3.X product and is synchronized with roll-out of similar GCCS products by Joint commands and other Services. GCCS-M 4.X will deliver to all designated warships and ashore installations by the end of FY 2010. GCCS-M 4.1 software capability upgrade was approved for Milestone B in FY 2005. GCCS-M 4.1 will deliver software-only capability improvements in late 2008 in response to emerging warfighter C4I requirements and evolving security and technology standards. GCCS-M will transition to the Net-Enabled Command Capability (NECC) based on Net-Centric Enterprise Services (NCES) over the FYDP as these joint programs deliver capability that can be implemented to naval afloat and ashore sites.

Status
GCCS-M Afloat is installed on 260 ships and submarines throughout the Navy. GCCS-M Ashore has been installed at 36 sites including the Chief of Naval Operations Navy Command Center; five fleet commander headquarters; and various allied/NATO sites.

Developers
Various COTS/GOTS

Information Assurance (IA)

Description
IA is defined as information operations that protect and defend information and Information Systems (IS) by ensuring their authenticity, availability, confidentiality, data integrity, and non-repudiation. The Navy's primary IA program is Information Systems Security Program (ISSP). FORCENet is the Navy's component to

the DoD Global Information Grid. The Navy has embraced a Defense-in-Depth strategy to protect FORCENet by employing multiple layers of protection starting at the desktops. The IA Technical Framework (IATF) has been adopted and divides ISSP resources into three fundamental categories: technology, operations, and people. The IATF provides a documented source of technical solutions and guidance mapped to the Defense-in-Depth goals. Selection, training, and retention of network security specialists are vital elements in our ISSP arsenal. ISSP focuses on development, acquisition, implementation, upgrade of the CND products and services such as firewalls, guards, Virtual Private Networks (VPN), intrusion detection systems, electronic key management systems, Public Key Infrastructure (PKI), and Common Access Cards (CAC). ISSP also focuses on the development of new cryptographic technology that can support a wide variety of applications and algorithms.

Status
Acquisition vehicles are in place for TYPE I Communications Security (COMSEC) and TYPE II COTS technologies to support the Navy's bandwidth requirements for secure voice and data, and PKI under the expanding umbrella of Key Management Infrastructure highlighted by the Navy's contributions to the DoD's Crypto Modernization (CM) program.

Developers
Space and Naval Warfare Systems Command (SPAWAR)

INMARSAT B

Description
The INMARSAT B High Speed Data (HSD) terminal includes a full duplex, medium data rate satellite terminal (INMARSAT B) and architecture that operates in the L-Band spectrum up to 128Kbps. INMARSAT B HSD is a FORCENet enabler which provides voice and data to small surface combatants (FFGs and MCMs). It also is installed on Command Ships, Air craft Carriers and large Amphibious platforms.

Status
The INMARSAT B HSD terminals are currently installed on 220 platforms. The CNO N6 Program of Record for INMARSAT B HSD satellite leases has been gradually reduced since PR05. The end date for INMARSAT B HSD continues to be evaluated and will be replaced by the Commercial Broadband Satellite Program (CBSP).

Developers
McKay
STRATOS

Integrated Broadcast Service/Joint Tactical Terminal (IBS/JTT)

Description

The IBS is a system-of-systems that will migrate the Tactical Receive Equipment and Related Applications Data Dissemination System (TDDS), Tactical Information Broadcast Service (TIBS), Tactical Reconnaissance Intelligence Exchange System (TRIXS), and Near Real-Time Dissemination (NRTD) system into an integrated service with a common format. The IBS will send data via communications paths, such as UHF, SHF, EHF, GBS, and via networks. This program supports Indications and Warning (I&W), surveillance, and targeting data requirements of tactical and operational commanders and targeting staffs across all warfare areas. It comprises broadcast-generation and transceiver equipment that provides intelligence data to tactical users. JTT receives, decrypts, processes, formats, distributes, and transmits tactical data according to preset user-defined criteria across open-architecture equipment. JTT is modular and has the capability to receive all current tactical intelligence broadcasts (TDDS, TADIXS-B, TIBS, and TRIXS). JTT is also interoperable with the follow-on IBS UHF broadcasts. However, the current JTT form factor does not meet space and weight constraints for a majority of the U.S. Navy and Air Force airborne platforms. Therefore, to ensure joint interoperability, the Navy and Air Force will continue to support the current Multi-mission Airborne Tactical Terminal (MATT) through a low cost Pre-Planned Product Improvement (P3I) program until the transition to an IBS capable JTRS airborne variant.

Status

A receive-only JTT was delivered to the Navy for early integration efforts in third quarter FY 2000. The Navy received the first four fully capable JTTs (with transmit capability) in third quarter FY 2001. The Navy commenced shipboard installations in fourth quarter FY 2001 for developmental testing. OT&E was completed in fourth quarter FY 2005. JTT fielding occurred from 2001 to 2004. Additional installations are scheduled for 2007 but remain unfunded. JTTs will continue to receive the legacy broadcasts (e.g., TDDS, TIBS, TRIXS) until next-generation broadcast services are developed and fielded.

Developers

IBS: TITAN/BTG; Fairfax, Virginia
JTT: Raytheon Systems; St. Petersburg, Florida

Integrated Shipboard Network System (ISNS)

Description
The ISNS program is a derivative of the common elements from various other programs of record with the purpose of providing robust LANs on all Navy ships. ISNS provides integration and support for all requisite classifications (i.e., SCI, TS, secret, non-U.S., and unclassified). It enables real-time information exchange within the ship and between afloat units, Component Commanders, and Fleet Commanders. It is also a key factor in the implementation of the Navy's portion of Joint Vision 2020. The ISNS program implements networks using a combination of network switches, hubs, routers, servers, PCs and commercial network software application technologies. It provides the capability to establish connectivity to the Defense Information Systems Network (DISN) WAN for global information distribution. In addition, it provides internal information dissemination capabilities for individual fleet units. By providing the infrastructure for shipboard C4I programs, ISNS facilitates implementation of the Navy's IT-21 strategy and is an enabler for network-centric warfare. It provides the transport medium for Web-enabling all IT-21 related programs (i.e., GCCS-M, Voice-Video-Data (VVD)). ISNS networks support the robust information flow requirements necessary to achieve *Sea Power 21* capabilities, and provides the backbone for information interoperability with coalition forces (CENTRIXS-M).

Status
ISNS installations have transitioned from ATM networks to the Gigabit Ethernet Architecture. Under current procurement and installation funding, IOC for ISNS Inc 1 is fourth quarter FY 2011; Inc 2 first quarter FY 2013; Inc 3 to be determined. ISNS was designated an ACAT II Major Weapons Systems on 16 August 2004.

Developers
Hardware for procurement and development of ISNS is under the cognizance of PEO C4I/Space PMW 160 as well as OPNAV (N6). These organizations work together to identify and implement the latest technologies to ensure proper implementation into the program. Engineering, development, integration, installation, training, and life cycle support will be accomplished through Navy and DoD activities.

Joint Interface Control Officer (JICO) Support System (JSS)

Description
The JSS is a "tool set" enabling the JICO to plan, monitor, and manage the Multi-Tactical Data Link (TDL) network in support of the Joint Force Commander. Using the Dynamic Network Man-

agement tool Network Control Technology (NCT), the JICO can accommodate required changes to the operating Network including unplanned entry and egress of Link -16 platforms. In his role as the manager of the multi-TDL network, the JICO contributes to maintaining the near real time Common Tactical Picture and responds to the requirements of the Joint Data Network manager.

Status
Milestone C for JSS is scheduled for FY 2007 with full-rate production to follow in FY 2008.

Developers
Northrop Grumman; Reston, Virginia

Joint Precision Approach and Landing System (JPALS)

Description
JPALS is a joint DoD effort with the U.S. Air Force and Army. The Air Force is currently designated the lead service. Navy will assume lead service during FY 2007. JPALS fulfills the need for a rapidly deployable, adverse weather, adverse terrain, day-night, survivable, interoperable and mobile precision approach and landing capability that can support the principles of forward presence, crisis response, and mobility. Sea-based JPALS consists of a GPS-INS based precision landing system component (Shipboard Relative GPS) with a low probability of intercept two way data link and an independent backup system. JPALS provides critical enabling technology for emerging Naval programs such as CVN 21, JSF, N-UCAS, and DDG 1000. Sea-based JPALS will also be installed on all air-capable surface ships and all CVN air wing aircraft (F/A-18E/F/G, E-2C/D, C-2A, and MH-60 R/S). Except for the system designated as the SRGPS backup, JPALS will replace the Automatic Carrier Landing System (ACLS) on CVNs, SPN-35 on LH-class Amphibious ships, and various approach systems including Instrument Landing Systems (ILS), TACAN, and Precision Approach Radar (PAR) ashore. JPALS will be civil interoperable and FAA certifiable.

Status
JPALS is in the Technology Development acquisition phase with Milestone B and SDD contract award scheduled in FY 2008. Sea-based JPALS IOC is 2014 and is on schedule to be installed on CVN 78, the lead ship of the CVN 21 program new design aircraft carrier.

Developers
The JPALS System Development and Demonstration (SDD) contract will be awarded in FY 2008 in open competition.

Joint Tactical Information Distribution System (JTIDS)

Description

The JTIDS Link-16 terminal provides rapid, secure, jam-resistant (frequency-hopping) communications, navigation, and identification capabilities appropriate for military use up to and including secret information. A joint program directed by OSD, JTIDS provides crypto-secure, jam-resistant, and low-probability-of-exploitation tactical data and voice communication at a high data rate to Navy tactical aircraft and ships and Marine Corps units. JTIDS also provides capabilities for common-grid navigation and automatic communications relay. It has been integrated into numerous platforms and systems, including Navy aircraft carriers, surface ships, and E-2C Hawkeye aircraft; Air Force Airborne Warning and Command System (AWACS) aircraft; and Marine Corps Tactical Air Operations Centers (TAOCs) and Tactical Air Command Centers (TACCs). Other service and foreign country participants include the Army, Great Britain, and Canada. Additionally, JTIDS has been identified as the preferred communications link for Theater Ballistic Missile Defense programs. JTIDS is the first implementation of the Link-16 Joint Message Standard (J-series) and provides the single, near real-time, joint data link network for information exchange among joint and combined forces for command and control of tactical operations.

Status

The Air Force is the lead service for JTIDS. The program successfully completed OPEVAL in August 1994 and was authorized to enter full-rate production in March 1995. Production is now complete. The Multifunctional Information Distribution System (MIDS) Low Volume Terminal (LVT) is the Pre-Planned Product Improvement (P3I) to the JTIDS terminal. The MIDS Joint Tactical Radio System (JTRS) terminal is the follow-on to MIDS LVT.

Developers

GEC-Marconi Electronics Systems; Wayne, New Jersey
Rockwell-Collins Avionics; Cedar Rapids, Iowa
Northrop Grumman; Bethpage, New York

Joint Tactical Radio System (JTRS)

Description

The JTRS is a software-programmable multi-band, multi-mode family of networked radios capable of simultaneous voice, data, and video communications. The program will effect the migration of more than 25 radio families, encompassing thousands of radio systems, to the JTRS family of radio systems. All radios will

be compliant with Software Communications Architecture (SCA), a single, open-system architecture. SCA provides the standards for all JTR software in the future. In addition, JTRS will be developed with a focus toward integrated Global Information Grid (GIG) transformational capabilities. At the same time the JTRS will be backwards compatible with selected legacy radio systems. At present there are five designated product lines that make up the JTRS family across DoD: Multifunctional Information Distribution System (MIDS), Airborne/Maritime/Fixed Station (AMF), Ground Mobile Radio (GMR), Handheld/Manpack/Small Form Fit (HMS) and JTRS Network Enterprise Domain (JNED). The JTRS requirements are derived from the Joint Tactical Radio System (JTRS) Operational Requirements Document (ORD) Version 3.2.1 dated 28 August 2006 to accommodate the Increment I requirements. A Capabilities Development Document (CDD) is currently being written to provide the capabilities needed for Increment II; it is expected to go to the JROC in May 2007. JTRS will enable FORCENet by implementing current tactical communications standards in addition to future higher data rate networking waveforms.

Status

In February 2005, USD (AT&L) established a Joint Program Executive Office (JPEO) for the JTRS program. In August 2005, the JPEO determined that the JTRS program required restructuring to reduce program risk. In August 2006 DEPSECDEF signed a memo on the new JTRS Management Structure and named SECNAV as the Lead DoD Component for JTRS. As such, all execution year funding will go through Navy to the JPEO.

Developers

Manufacturers to be determined in open competition.

Lightweight Super High Frequency Satellite Communications

Description

The Super High Frequency (SHF) Satellite Communications (SATCOM) terminal AN/WSC-6(V) and parabolic antenna enables Navy ships to access the Defense Satellite Communications System (DSCS) for reliable, secure, beyond line-of-sight information exchange at medium-to-high data rates. This capability is provided by upgraded and new WSC-6 terminal variants and enhancements to the submarine High Data Rate Antenna, which provides an SHF capability for the Navy's attack submarines. Key services available via SHF SATCOM are: Defense Information Systems Network (DISN), Global Command and Control System (GCCS and GCCS-M), broadcast record message traffic, Tomahawk Mission Planning packages and updates, imagery support, DSN telephone/ISDN access, Joint Deployable Intelligence Sup-

port System (JDISS), Joint Worldwide Intelligence Communications System (JWICS), Unclassified-but-Sensitive Internet Protocol Router Network (NIPRNET), Secret Internet Protocol Router Network (SIPRNET), and Video Information Exchange System (VIXS)/Video Teleconferencing (VTC).

Status
SHF SATCOM capability is being provided to Navy surface ships by several WSC-6 variants according to the requirements of those platforms. Surveillance Towed Array Sensor (SURTASS) platforms are configured with the WSC-6(V)7. One aircraft carrier has the WSC-6 (V)4 variant. Numbered fleet commander flagships (LCC), the other aircraft carriers, and flag-capable amphibious ships (LHA/LHD) are configured with the WSC-6(V)5. This variant provides a dual-termination capability, enabling the ships to establish and simultaneously maintain their C4I links with Naval Computer and Telecommunications Area Master Stations (NCTAMS) and additional links with an Army, Marine Corps, or Air Force Ground Mobile Force (GMF) SHF terminal ashore in the AOR. The WSC-6(V)7 is a single-termination variant being fielded on Aegis cruisers and amphibious ships (LPD and LSD). The WSC-6(V)9 is a single-termination, dual (C/X) band terminal developed to provide wideband, high data rate capability to guided missile destroyers (DDGs) and amphibious ships (LPDs and LSDs). The WSC-6(V)9 terminal is in the process of being fielded on all DDGs (to be completed in FY 2009). Future terminal plans include the Navy Multi-Band Terminal (NMT). All WSC-6(V) variants will be equipped with the Enhanced Bandwidth Efficient Modem (EBEM) (tactical variant) in the FY 2007 to FY 2009 timeframe.

Developers
Electro-Space Inc.; Dallas, Texas
Raytheon; Marlborough, Massachusetts
Various COTS/NDI

Mark XIIA Mode 5 Identification Friend or Foe (IFF)

Description
The Mark XXIIA Mode 5 IFF is a secure, real-time, cooperative blue force combat identification system. Combat identification is a prerequisite in FORCENet, thereby becoming a precondition for each of the other pillars as well. IFF Mode 5 uses technology advances in modulation, coding and cryptographic techniques to provide reliability, security, and performance improvements over Mode 4. It is implemented through evolutionary upgrades to Mark XIIA interrogators, transponders, and processors. Mode 5 can be fielded on all DoD platforms, whether Link-capable or not. It is NATO and JROC-approved and meets U.S. and international civil IFF requirements.

Status
The Navy's ACAT II program of record is based on the improved Mark XII Cooperative IFF Operational Requirements Document, dated 27 April 2001. It will be installed on over 3,000 ships and Navy and Marine Corps aircraft. The program does not include fielding of the shipboard control and display unit, F/A-18 platform integration, or Mode S shipborne interrogation capability. Milestone C was achieved in July 2006. IOC is first quarter FY 2009; FOC is 2015. Navy is the lead service for Mode 5 cryptographic modernization and Mode 5 synchronization across the services. Army and Air Force plan leveraging off Navy development.

Developers
BAE Systems; Greenlawn, New York
General Dynamics Decision Systems; Scottsdale, Arizona

Military Flight Operations Quality Assurance (MFOQA)

Description
MFOQA is a process using data collected during flight to conduct post-flight analysis of aircrew and aircraft systems performance after every flight. No additional equipment is mounted on the aircraft platform and no additional tasking is added to the aircrew during flight. The aircrew can remove the data collection card and take it to the squadron ready room and load in the data to squadron computers. Applying MFOQA software already loaded in the computer, the aircrew can replay the flight in animation, noting geographic position, instrument readings and aircraft performance parameters. Through this analysis and recording, maintenance personnel can perform diagnostic analysis of the aircraft systems, aircrews can self-evaluate their performance, and squadron leadership can review and counsel on flight procedures, safety issues and training issues. The ultimate payoff will be increased readiness. Data from the flight is aggregated, after removal of aircrew and aircraft identification, for trend analysis at upper tiers of command at the group, wing and type command level. Flight operations quality assurance has been used in the commercial aviation industry for several years. Surveys of the airlines have yielded high praise for this process and for its benefits to maintenance, operations, safety, and training.

Status
The Navy has developed a plan to implement MFOQA across Naval Aviation. The lead aircraft is the F/A-18C/D/E/F, followed by the MH-60R/S helicopters, the CH-53E heavy lift helicopter, the MV-22B tilt-rotor aircraft and the T-45 trainer. Initiated with funding beginning in FY 2006, the current schedule is to achieve IOC in first quarter FY 2010

Developers
To be determined.

Multi-functional Information Distribution System Joint Tactical Radio System (MIDS-JTRS)

Description
The MIDS-JTRS is an engineering change proposal migrating the MIDS Low Volume Terminal (LVT) to Joint Tactical Radio System Software Communication Architecture (SCA) compliance. MIDS JTRS will be a four channel software programmable radio capable of processing Link-16 on one dedicated channel and other JTRS waveforms on the remaining three channels.

Status
MIDS-JTRS is in early development with IOC in the F/A-18 expected in FY 2009.

Developers
ViaSat; Carlsbad, California
Data Link Solutions; Cedar Rapids, Iowa

Multi-functional Information Distribution System (MIDS-LVT)

Description
MIDS-LVT is a multi-national cooperative development program to design, develop, and produce a tactical information distribution system equivalent to Joint Tactical Information Distribution System (JTIDS), but in a low-volume, lightweight, compact terminal designed for fighter aircraft with applications in helicopters, ships, and ground sites. Navy procurement, limited by available resources, is targeted for F/A-18 Hornet aircraft as the lead aviation platform and surface craft. MIDS-LVT is a pre-programmed product improvement and replacement for JTIDS, providing identical capabilities at reduced size, weight, and cost. As a P3I of the JTIDS Class 2 Terminal, the MIDS-LVT will employ the Link-16 (TADIL-J) message standard of Navy/NATO publications. MIDS-LVT is fully interoperable with JTIDS and was designed in response to current aircraft, surface ship, submarine, and ground host volume and weight constraints. The solution variants, MIDS-LVT (1), MIDS-LVT (2), and MIDS-LVT (3), support Navy, Marine Corps, and Air Force aircraft; Navy ships; Army Patriot, THAAD, MEADS and ground-based defense systems; Air Force and Marine Corps ground-based command and control platforms; and potentially other tactical aircraft and ground-based systems. MIDS-LVT is an international project partnering the U.S. with Germany, Spain, Italy, and France. The MIDS-LVT (1) variant will be used in the MIDS on ship program providing the Link 16 capability to new Construction Surface Combatants.

Status
The program entered the engineering, management and development (EMD) phase in December 1993. MIDS was approved for LRIP in FY 2000. It reached IOC on the F/A-18C/D Hornet in FY 2003. MIDS is being procured for F/A-18 C/D/E/F/G aircraft. The U.S. is the MIDS-LVT program leader with Germany, Spain, Italy, and France entering into a European partnership, called EUROMIDS. The Air Force F-15 fighter variant, MIDS-LVT (3), is currently in full-rate production and has reached IOC. The Army variant, LVT-2 entered full-rate production in September 2003. The Navy/Air Force variant, LVT-1, passed OPEVAL and was authorized to enter full-rate production on 9 September 2003. MIDS on ship is scheduled for IOC in late FY 2006. Additionally, in order to maintain continuity with the MIDS-JTRS initiative, Program Management and Acquisition Authority for the MIDS-LVT has transitioned to the JTRS JPEO with resource sponsorship under the oversight of CJCS (J6). However, contract management and procurement responsibilities remain with COMNAVSPAWAR (PMW-780).

Developers
ViaSat; Carlsbad, California
Rockwell-Collins; Cedar Rapids, Iowa
Data Link Solutions; Cedar Rapids, Iowa
An International consortium, MIDSCO, developed MIDS-LVT. EUROMIDS will be the European producer of MIDS terminals

Mobile User Objective System (MUOS)

Description
The MUOS will provide a replacement tactical narrowband satellite communications (SATCOM) capability to the UHF Follow-On (UFO) satellite program. MUOS has been designated a DoD Space Major Defense Acquisition Program (MDAP) and will leverage commercial technology to the greatest degree possible. It will provide tactical narrowband netted, point-to-point, and broadcast services of voice, video, and data worldwide. It will consist of four geo-synchronous satellites plus a spare and provide a four-fold increase in network accesses. The target users are unified commands and joint task force components, DoD and non-DoD agencies, and allied and coalition mobile users who need to communicate while on the move.

Status
Concept exploration studies, AoA, the component advanced development phase, and preliminary design review have been completed. PEO Space, PMW 146 awarded the RR&DD contract to Lockheed Martin on 24 September 2004. MUOS has now entered the critical design review phase and is expected to reach On Orbit Capability (OOC) in 2010. The program successfully completed

Key Decision Point (KDP) C on 1 August 2006 and gained Milestone Decision Authority (MDA) to continue with the final design. Build Decision for the first two satellites is scheduled for October 2007. The MUOS Capability Production Document (CPD) is in formal Navy review.

Developers
Lockheed Martin; Sunnyvale, California
Boeing; El Segundo, California
General Dynamics; Scottsdale, Arizona

Link-22

Description
Link-22 is the next-generation NATO Tactical Data Link also referred to as the NATO Improved Link Eleven (NILE). It is a co-development program with seven NATO countries and is in the latter half of its research and development phase. As an evolutionary new Link design, Link-22 is based on modern, media-independent networking technology that will be applied in the exchange and forwarding of tactical data at extended ranges and between multiple networks over a variety of RF media. A member of the J-series family, Link-22 will complement Link-16 by providing Beyond Line of Sight (BLOS) connectivity among C2 platforms and modern, robust, relay/routing techniques. The Link-22 design includes a growth feature to accommodate the addition of SATCOM media for BLOS J-series data exchange. Link-22 will support interoperability with critical allied/coalition partners that have transitioned from Link-11 to Link-22 but do not possess a Link-16 capability. Implementation of Link-22 will ensure allied/coalition forces maintain the level of situational awareness required to plan and execute coordinated combat operations across the allied/coalition Area of Responsibility. Since Link-22 is an evolutionary Tactical Data Link (TDL), the Next Generation Command and Control Processor (NGC2P) will implement hardware and software changes that will provide a full Link-22 capability with little, if any change, to host combat systems.

Status
Link-22 was introduced in an adjunct processor to Common Data Link Monitoring System (CDLMS) in FY 2006. Full Link-22 functionality will be introduced as part of the Next Generation Command and Control Processor (NGC2P) in FY 2007.

Developers
Northrop Grumman; San Diego, California
VIASAT; San Diego, California
SPAWARSYSCEN; San Diego, California

NAVSTAR Global Positioning System (GPS)

Description

The NAVSTAR GPS is a space-based, satellite, radio navigation system that provides users with worldwide, all-weather, three-dimensional positioning, velocity, and precise time data. Navy requirements include the integration of GPS in more than 300 surface ships and submarines, 5,100 aircraft, as well as integration of shipboard combat systems with the Navigation Sensor System Interface (NAVSSI), and anti-jam protection for high-priority combat platforms through the Navigation Warfare (NavWar) Program. GPS plays an important role not only in navigation, but also in precision strike weapons, naval surface fire support systems, and ship C4I systems. NAVSSI is a system that collects, processes, and disseminates position, velocity, and timing data to weapons systems, and C4I and combat support systems onboard surface warships. This system hosts embedded, next-generation, card-based GPS receivers. NavWar will provide anti-jam antennas for the protection of select naval platforms to ensure a continued high level of mission effectiveness in a GPS-jamming environment. NavWar also incorporates the capabilities of GPS modernization into Navy user equipment to receive future military satellite signals.

Status

All ships and submarines have completed their initial GPS installations. Aircraft integrations are ongoing. The FY 2007 budget supports equipping the remaining planned aircraft with initial GPS capability, providing surface combatants with modernized NAVSSIs through the FYDP, and ensuring that the GPS signal is protected on naval platforms.

Developers

Rockwell-Collins; Cedar Rapids, Iowa
Raytheon; Los Angeles, California
Trimble Navigation; Sunnyvale, California
Litton Data Systems; San Diego, California

Navy EHF/AEHF Navy Extremely High Frequency Satellite Communications

Description

The Navy Multi-band Terminal (NMT) is the future satellite communications (SATCOM) terminal that will provide protected and wideband SATCOM services for Navy ships, submarines, and shore stations. NMT replaces the AN/USC-38/Follow-on Terminal (FOT). NMT will provide a family of anti-jam, low-probability-of-intercept, and low probability of detection EHF SATCOM terminals. NMT supports a variety of protected command-and-

control and communications applications (i.e., secure voice, imagery, data, and fleet broadcast systems). The NMT replaces the WSC-6 terminal series, which provides key wideband SATCOM services via SHF. NMT services include Defense Information Systems Network, Global Command and Control System, broadcast record message traffic, Tomahawk Mission Planning, imagery support, DSN telephone/ISDN access, Joint Deployable Intelligence Support System, Joint Worldwide Intelligence Communications System, Unclassified-but-Sensitive Internet Protocol Router Network, Secret Internet Protocol Router Network, and Video Information Exchange System/Video Teleconferencing. The NMT will also enable the Global Broadcast Service (GBS) suite to access the GBS broadcast. The NMT will be interoperable with Army and Air Force terminals. The NMT will allow access to: protected EHF SATCOM services available on Milstar; EHF payloads onboard Ultra High Frequency Follow-On satellites, and three planned (one operational in 2003) Polar EHF payloads. NMT will also allow wideband (X band) access to the Defense Satellite Communications System (DSCS) satellites and to the follow on Wideband Gapfiller Satellites (WGS). Additionally, NMT will expand protected SATCOM services to include those provided by the Advanced EHF (AEHF) satellites.The terminal will operate in the EHF and SHF radio frequency spectra (X, Ka, Ku, and Q bands). The terminal will support the current EHF waveforms: EHF Low Data Rate (LDR) - 75 bps to 2400 bps, and EHF Medium Data Rate (MDR) - 4.8 Kbps to 1.544 Mbps. The NMT will also support the AEHF waveform, which will extend data-rates up to 8.129 Mbps (XDR).

Status

The NMT received Milestone B approval in October 2003. FY 2007 focuses on NMT prototype development by two competing contractors, leading to the award of an engineering development model contract in July 2007. Initial fielding is planned for FY 2012. The Follow-on Terminal (FOT) version of the AN/USC-38 (V) will reach FOC in 2007 for ships and 2009 for submarines.

Developers

NESP and FOT: Raytheon; Marlborough, Massachusetts
NMT Developers: Raytheon; Marlborough, Massachusetts
Harris; Melborne, Florida

Navy Meteorological/Oceanographic Sensors (METOC) Sensors (Space)

Description

The Navy METOC Sensors (Space) program supports Navy interests in meteorological and oceanographic (METOC) space-based remote sensors. These interests include commitments to satellite, sensor, and operational development activities associated with

the Defense Meteorology Satellite Program (DMSP) and the National Polar-orbiting Operational Environmental Satellite System (NPOESS). The sensors carried on DMSP and future NPOESS satellites provide global oceanic and atmospheric data of direct operational relevance, including sea surface temperature, wind speed and direction, sea ice conditions, precipitation rates, and storm intensity. The program provides for Navy participation in Navy/Air Force cooperative efforts leading to current and future METOC sensor development, including calibration and validation of instruments and delivery of satellite products to the Fleet.

Status

In October 1997, the program commenced development of Coriolis/Windsat, the world's first space-based sensor that passively measures ocean surface wind speed and direction, launched in December 2002. Development of the Airborne Polarmetric Microwave Imaging Radiometer (APMIR) for calibration and validation (cal/val) of the Air Force Special Sensor Microwave Imager/Sounder (SSMIS) and Coriolis/Windsat, began in early FY 1998. APMIR is in service to support the first SSMIS mission on DMSP-F16, launched in October 2003. APMIR will continue as an ongoing cal/val program for DMSP, Coriolis/Windsat, and NPOESS microwave radiometer sensors. In addition to these projects, discussions are underway with NASA, NOAA, and other agencies to fulfill the long-standing requirement for geostationary environmental imagery of the Indian Ocean.

Developers

WINDSAT Sensor: Naval Research Laboratory(NRL); Washington, District of Columbia
CORIOLIS Spacecraft: Spectrum Astro; Gilbert, Arizona

Navy Marine Corps Intranet (NMCI)

Description

NMCI is a long-term initiative between the DoN and the private sector to deliver a single, integrated department-wide network for Navy and Marine Corps shore commands. The NMCI contract, awarded in October 2000, as a seven-year contract with a three-year option, has been extended through 30 September 2010. The contract allows DoN to procure service-wide IT services and provides the shore network infrastructure within the CONUS for the Navy's FORCENet architecture. NMCI provides comprehensive end-to-end information services for data, video, and voice communications for DoN military and civilian personnel and connects to the GIG, making the DoN workforce more efficient, more productive, and better able to support the critical DoD warfighting missions.

Status
NMCI is operational and continues to provide commercial IT services for nearly half a million DoN employees and one Combatant Commander. To date, the DoN has ordered 348,000 of the expected FY 2007 seats and deployed 306,751 end-state seats. Implementing NMCI has enabled the DoN to increase the security posture of its networks and has provided unprecedented visibility into IT costs.

Developers
The NMCI contract was awarded to a team of contractors led by Electronic Data Systems (EDS). The remainder of the contractor team comprises Verizon Business (communications circuits), Microsoft (operating systems and desktop software), Dell (desktop hardware and servers), WAMNET (network architecture), Cisco (switching and network devices), Raytheon (information assurance).

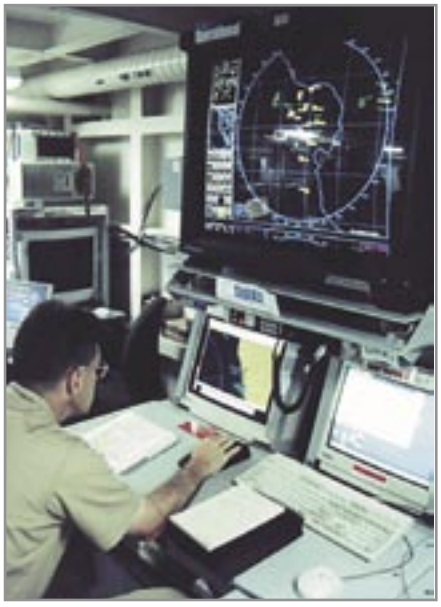
Naval Tactical Command Support System (NTCSS)

Description
NTCSS is the combat logistics support information system used by Navy and Marine Corps Commanders to manage and assess unit and group material and personnel readiness. As the logistics management cornerstone of the Sea Base pillar of *Sea Power 21*, NTCSS provides intermediate and organizational maintenance, supply, and personnel administration management capabilities to surface, sub-surface, and aviation operational commanders in peacetime and during war. NTCSS also supports network-centric warfare by integrating logistics information to complement the tactical readiness picture for operational commanders. Through an evolutionary acquisition strategy, NTCSS replaced, merged, and optimized legacy Shipboard Non-tactical ADP Program (SNAP), Naval Aviation Logistics Command Management Information System (NALCOMIS), Maintenance Resource Management System (MRMS), and several smaller logistics applications into an integrated and modernized capability. The first stage of the strategy included hardware modernization and network installations using open system architectures and operating environments common with shipboard tactical programs. The second stage optimized the functional applications using modern software development tools, relational databases, and data replication. Going forward, Business Process Improvements will be developed and implemented under sponsorship of functional and fleet managers. Such planned initiatives include: transfer of shipboard logistics data ashore as part of a broader initiative to Move Workload Ashore and reduce shipboard manpower; making NTCSS data accessible via the Common Operational Picture to enable operational decisions based on near-real time readiness data; and merging systems such as NTCSS, GCSS-MC, and GCSS-M into a unified capability that exchanges data with Naval Enterprise Resource Planning (ERP). As a result, the Navy and Marine Corps will realize increased efficiencies and reduced total ownership costs.

Status
NTCSS is a mature program in full-rate production and continues to be the warfighter's production system to maintain Fleet readiness. FOC at Naval Air Stations and Marine Air Logistics Squadrons has been achieved. FOC for ships and submarines will be achieved by FY 2010. An optimized NTCSS capability, targeted for aircraft squadrons, is undergoing Follow-On Test and Evaluation and pursuant to a fielding decision in FY 2007 will achieve FOC by FY 2011. Upon FOC, a Tech Refresh Phase will replace antiquated NTCSS Hardware/Software and maintain compliance with DoD/DoN Information Assurance and Baseline Reduction mandates.

Developers
The COTS hardware is being procured through indefinite delivery/indefinite quantity government contracts. Engineering, development, integration, installation, training, and life cycle support will be accomplished through Navy and Defense Department activities, with additional support from industry partners.

Open Architecture (OA)



Description
OA is a core Sea Enterprise component transforming Navy acquisition processes and a critical FORCENet enabler. A broad, operationally focused open architecture definition means having the business and technical environment that encourages collaborative competition for third party developers to replace or add a module anywhere, anytime in a system. The objective is rapid, affordable translation of Fleet requirements into Fleet capabilities. Open business practices are a cost-effective means to that end.

Status
Surface Navy programmed funding for OA beginning in 2003. The CG and DDG Modernization plan started with a technical undertaking to open architecture with de-couple hardware from software for cost-effective sustainment by 2008. All the surface combat systems (AEGIS, SSDS, LCS, DDG 1000 and ACDS through CNI) are under review to ensure development of scalable, modular software application components and to provide greater business opportunities for competitive alternatives. The acquisition-led OA Enterprise Team (OAET) is adopting broader business aspects of "open architecture" for more collaborative competition within and across programs; including small business involvement through the ONR-led Small Business Innovative Research (SBIR) program. By expanding third party Developers' involvement using the SBIR program, the rapid capability insertion program (RCIP) will deliver cost-effective, common capability quickly and more efficiently to the fleet.

Developers
More than 80 companies nationwide, including:

Lockheed Martin; Moorestown, New Jersey; Syracuse, New York; Eagan, Minnesota
Sippican; Marion, Massachusetts
Advanced Acoustic Concepts; Hauppauge, New York
BAE Systems
General Dynamics Advanced Information Systems; Fairfax, Virginia
General Dynamics Information Systems; Arlington, Virginia
General Dynamics Bath Iron Works; Bath, Maine
Northrop Grumman Ship Systems; Pascagoula, Mississippi
Northrop Grumman PRB Systems; Goleta, California
Raytheon; St. Petersburg, Florida; Sudbury, Massachusetts; San Diego, California
Raytheon Missile Systems; Tucson, Arizona
Space and Naval Warfare Systems Center; San Diego, California
Johns Hopkins University Applied Physics Laboratory; Laurel, Maryland
SECHAN Electronics; Lititz, Pennsylvania
Integrated Combat Systems Test Facility (ICSTF); Dam Neck, Virginia
Space and Naval Warfare Systems Center; San Diego, California
Naval Surface Warfare Center; Dahlgren, Virginia; Port Hueneme, California
Naval Undersea Warfare Center; Keyport, Washington; Newport, Rhode Island

Tactical Switching

Description
Tactical Switching and its implementation, formerly known as the Shore Infrastructure Master Plan (SIMP), is focused on the automation and conversion of the existing circa-1970 Serial Switched point-to-point shore infrastructure connecting three Navy Computer and Telecommunications Area Master Stations (NCTAMS), ten Navy Computer and Telecommunications Stations (NCTS), 27 NCTS Detachments, 23+ Network Operation Centers (NOC), and 5,270 personnel. The plan currently underway will invoke multiple spirals to implement new technology and automation and infrastructure necessary to evolve the shore infrastructure to two Regional Network Operations and Security Centers (Atlantic/Pacific) and one Global Network Operations and Security Center providing interoperable joint global network-centric services and connectivity to tactical and strategic naval assets. Through this technology and remote management capabilities, this architecture will be managed, monitored, operated, maintained, and defended with fewer than 50 percent of today's manpower resources and eliminate more than 70 percent of today's fixed sites further re-

ducing infrastructure costs.

Status
During FY 2005, the Tactical Switching program provided High Speed Global Ring (HSGR) connectivity between the five critical regions, which enabled accelerated consolidation of services into the Atlantic and Pacific regions. Significant progress has been made to convert the existing Tactical Video Teleconferencing (VTC) to IP reducing reliance on the serial infrastructure and installation of Element Management Systems that will enable remote management and operations of existing equipment. During FY 2006, Enterprise Management and Monitoring systems were evaluated and purchased to further consolidate services and personnel as well as provide tactical and strategic visualization of the Navy enterprise to service and Combatant Command/Commander (COCOM) agencies NetOps in support of GIG operations. Initial Network Management System implementation will be delivered to RNOSC East and West in early FY 2007.

Developers
PEO C41 and Space; San Diego, California

Trusted Information Systems (TIS)

Description
TIS provides a complete cross-domain capability for the automatic exchange of critical intelligence and operational information between U.S., Allied, and Coalition forces. TIS includes both the Radiant Mercury (RM) and Joint Cross Domain Exchange (JCDX) systems. Both systems are Director of Intelligence Directive 6/3 Protection Level 4 (PL-4), Multi-level Secure (MLS) certified providing unique cross-domain information sharing capabilities from top secret Sensitive Compartmented Information (SCI) to General Services (GENSER) and GENSER to unclassified.

RM is certified and accredited by both the SCI (top secret and below interoperability) and GENSER (secret and below interoperability) communities. RM provides a fully-automated, bi-directional, multiple input/output channel capability, that can be serial or network connected, to sanitize, transliterate, downgrade, and guard classified, formatted information to users at lower classification levels. RM also processes unformatted message types and imagery utilizing reliable human review (semi-automated). RM is deployed to more than 200 sites worldwide including all Combatant Commands, aircraft carriers and large-deck amphibious warships, Shared Early Warning, Blue Force Tracking and numerous Air Force and Army sites as well as national agencies.

JCDX is DoD's only comprehensive multi-level C4I system certified to connect to multiple networks at multiple security levels. JCDX serves as the backbone automated information system pro-

viding accredited manual and automatic exchange of multilevel Common Operational Picture (COP), e-mail, imagery, and event-by-event data dissemination. The system provides MLS C4I and cross-domain services to U.S. Joint Intelligence Centers and is the national level defense intelligence system for the United Kingdom and Australia, and is the service-level operational intelligence system for the Japanese Maritime Defense Forces and the Republic of Korea.

Status
JCDX is currently being phased-out of the U.S. inventory in FY 2007 and will be replaced by the Global Command and Control System (GCCS) Integrated Imagery and Intelligence (I3). JCDX Foreign Military Sales customers and Maritime Surveillance System (MSS) sites are currently assessing the impact of this decision. Other developments within TIS are focused on migrating RM's certified MLS capabilities into a Services Oriented Architecture and integrating with additional afloat, joint, and coalition-network architectures. As the Executive Agent of the multi-service RM program, the Navy will continue to oversee RM and RMIG support to more than 200 locations worldwide.

Developers
Maxim Systems; San Diego, California
Northrop Grumman Mission Systems; Arlington, Virginia
Lockheed Martin; Denver, Colorado
Booz-Allen-Hamilton; Chantilly, Virginia

Ultra High Frequency (UHF) Follow-On (UFO)

Description
The Ultra High Frequency (UHF) Follow-On (UFO) satellite program comprises eight satellites and it replaced the Fleet Satellite (FLTSAT), Gapfiller, and Leased Satellite (LEASAT) UHF constellations. UHF SATCOM services, provided by UFO, include worldwide, narrowband, unprotected netted, point-to-point, and broadcast service of voice, video, and data using 5 and 25 Khz UHF channels. UFO also provides a protected Fleet Broadcast using an Extremely High Frequency (EHF) uplink and UHF downlink to provide an anti-jam capability on the uplink. UFOs 4-11 carry an EHF payload that provides anti-jam capability on the uplink and downlink. Protected services include netted, point-to-point, and broadcast service of voice and data. The EHF payload also provides an anti-jam telemetry tracking and control uplink capability. UFOs 8-10 also include a Global Broadcast Service (GBS) payload. GBS uses direct broadcast technology at an extremely high data rate to many users via very small terminals.

Status
Eleven satellites have been launched and eight are operational. The launch of UFO 1 was a failure and UFO 10 was launched

in November 1999 as a replacement. A Gapfiller (UFO-11) was launched in December 2003 to maintain constellation availability at minimum acceptable 70 percent through 2010 to coincide with the launch of MUOS. UFO 3 failed in orbit in June 2005 and UFO 9 failed in orbit in August 2006. This moved the UFO 70 percent availability from 2010 to 2007. Mobile User Objective System (MUOS) is still on track to begin replacing UFO in 2010 leaving a potential 28 month gap.

Developers
Boeing Satellite Systems (BSS); Los Angeles, California
SPAWAR Systems Command; San Diego, California

Undersea Warfare-Decision Support System (USW-DSS)

Description
The USW-DSS program provides an integrated, near-real time, network-centric Undersea Warfare (USW) Command and Control (C2) capability across multiple platforms, even with low bandwidth or intermittent inter-platform communications. USW-DSS leverages existing communication links, networks, contact pictures, and sensor data from air, surface, submarine, theater, and surveillance platforms and integrates them to produce a common USW near-real time decision support tool. It provides a critical capability, not only for the Sea Combat Commander (SCC), but also for the Theater USW Commander (TUSWC), Antisubmarine Warfare Commander (ASWC), and Mine Warfare Commander (MIWC), for an integrated capability to plan, conduct, and coordinate USW operations with multiple ASW and MIW platforms. USW-DSS will provide common and improved visualization, integrated USW platform sensor data sharing, reduced data entry, improved performance prediction, data fusion and reduce redundancy across USW Tactical Decision Aids (TDA). USW-DSS will provide greater understanding of the undersea battle space by allowing the entire force (CSG/ESG, theater, or other) to have a common, thorough understanding of the battle space with characterized uncertainties. USW-DSS uses the spiral development process. A peer review group will select current and developmental technologies to be incorporated into a build-test-build process to develop a network-centric USW capability. Current plans are for USW-DSS to transition into a GCCS-M application with a subsequent migration as part of a maritime application in Net Enabled Command Capability (NECC).

Status
USW-DSS currently uses a Top Level Requirements (TLR) document signed by the Warfare Sponsor, Task Force ASW (formerly N74) on 2 October 2003, and was documented based on high-level guidance from a Net-Centric USW (NCUSW) Mission Needs

Statement (MNS). The TLR was further updated to incorporate new requirements resulting from the 2005 C2 in ASW Study. A Capability Production Document (CPD) reflecting the requirements in the TLR is in draft form. In FY 2007, USW-DSS will be installed on two carrier strike groups as well as theater USW assets.

Developers

Multiple Navy and university labs and industry participants will perform the various developer and manufacturer roles. The software integration role for Build 2 and follow will be a full and open competition.

Airborne

Aerial Common Sensor (ACS)

Description

The transformation of Naval Airborne Information Warfare is driven by the need for a capability supporting a variety of ISR, target acquisition and Information Warfare/Operations (IW/IO) missions during peacetime and through all levels of war. The aging EP-3E aircraft will be replaced once a suitable replacement platform is identified. This replacement platform will align with all *Sea Power 21* pillars, but will primarily support FORCENet by providing fused Multi-INT derived time critical, actionable information to the warfighter. Accomplishing this requires a combination of sensors, including Signals Intelligence (Communication Intelligence/Electronic Intelligence), Imagery Intelligence (IMINT) Electro-Optical (EO)/Infrared (IR), Synthetic Aperture Radar (SAR), Multi-Spectral and Hyper-Spectral Imaging (MS/HSI), Ground/Maritime Moving Target Indicator (G/M MTI), and Measurement and Signatures Intelligence (MASINT) systems. The follow-on EP-3E will be capable of multiple operational configurations, using a combination of onboard and off-board collection, processing and reporting operations. The new platform will be a primary ISR node within FORCENet and will use joint standards and architectures to achieve interoperability across the Global Information Grid. This transformational process will allow for optimum use of external processing while maintaining exploitation, fusion, and dissemination capabilities within the battlespace. The aforementioned capabilities will allow for better use of Low Density/High Demand (LD/HD) personnel assets, deploy with a smaller footprint, and garner a significant manpower reduction. Supporting the Navy objective to provide immediately employable forward-deployed naval forces, the new platform will deploy anywhere in the world within 72 hours. Operating initially without support and with a minimum footprint, it will be capable of conducting operations en route and immediately upon arrival in theater.

Status
Initial Army ACS contract (addressing JROC approved Army and Navy ISR requirements) was awarded to Lockheed Martin in July 2004 and terminated in January 2006. ACS program development preceeded a 2006 Joint service study of ISR requirements which identified the requirements to develop this capability. The EP-3E will be modernized to a common configuration and sustained until a replacement platform is fielded.

Developers
To be determined.

E-2 Hawkeye Airborne Early Warning Aircraft Upgrade

Description
The E-2 Hawkeye is the Navy's airborne surveillance and command-and-control platform, providing battle management and support of decisive power projection at sea and over land in a joint operational architecture. In addition to current capabilities, the E-2 has an extensive upgrade and development program to prepare it as a critical element in an overall joint theater air and missile defense program.

Two upgrades that will ensure that Hawkeyes keep pace with changing tactical environments are the E-2C Hawkeye 2000 and the E-2D Advanced Hawkeye (AHE), including the Radar Modernization Program (RMP). The E-2C Hawkeye 2000, the most advanced Hawkeye variant in production, features Mission Computer Upgrade (MCU), Cooperative Engagement Capability (CEC), Improved Electronic Support Measures (ESM), Joint Tactical Information Distribution System (JTIDS), Global Positioning System (GPS), and data and voice satellite communications. The MCU greatly improves weapons systems processing power enabling incorporation of CEC. In turn, CEC-equipped Hawkeyes will significantly extend the engagement capability of surface forces. It is key to early cueing of the Aegis Weapon System, dramatically extending the lethal range of the Standard Missile (SM-2). Advanced Hawkeye's RMP is developing a radar that will bring over-the-horizon, overland detection, and tracking to the strike group. This and CEC will fully integrate Advanced Hawkeye into the Joint Integrated Air and Missile Defense (JIAMD) role. This advanced detection and tracking capability, in conjunction with Aegis and upgraded Standard Missiles, will allow strike groups to deploy an organic, theater-wide air and cruise missile Sea Shield umbrella to protect high-priority areas and U.S. and coalition forces. The E-2's systems are fully interoperable with the Airborne Warning and Control System (AWACS) and ground-based systems for a seamless joint architecture. The Hawkeye will continue as the airborne "eyes and ears" of the fleet as it applies its capabili-

ties in the integrated joint, overland, theater-wide air and cruise missile-defense environment. Many technological upgrades being incorporated in the Hawkeye represent leading-edge improvements for U.S. forces, not just in the Navy's theater air and missile defense programs.

Status
Two E-2D Advanced Hawkeye System Development and Demonstration aircraft had a "Keel Start" ceremony in April and July 2005. First flight is scheduled for fourth quarter FY 2007, with IOC in FY 2011.

Developers
Northrop Grumman; Bethpage, New York
Northrop Grumman; St. Augustine, Florida

EP-3E Modification and Sustainment

Description
The EP-3E is the Navy's airborne Information Warfare (IW) and tactical Signals Intelligence (SIGINT) platform supporting naval and joint commanders. EP-3Es provide long-range, high-endurance support to aircraft carrier strike groups and expeditionary strike groups in addition to performing independent maritime operations. The current force consists of two active squadrons. The original EP-3E Joint Airborne SIGINT Architecture Modification (JMOD) program has been restructured to bring all EP-3E platforms into a common configuration and will be sustained until Aerial Common Sensor (ACS), a joint development program with the Army, can be fielded with an FOC of approximately 2017. EP-3E modernization/sustainment strategy includes three elements: P-3 to EP-3E conversions; EP-3E JMOD common configuration; and airframe inspections/repairs.

• **P-3 to EP-3E conversions:** The P-3 to EP-3 conversion program converts five P-3C Orion aircraft to EP-3E platforms. Two were completed in FY 2006 and three are scheduled for completion in FY 2007.

• **EP-3E JMOD Common Configuration (JCC):** The EP-3E JMOD Program has been restructured to align all EP-3E mission systems to a common baseline that meets the challenge of rapidly emerging threat technology, identified as the JCC. JCC will address mission system obsolescence and incorporate "quick reaction" capabilities specifically developed for Operations Enduring Freedom and Iraqi Freedom. JCC will also accelerate capabilities, developed under the JMOD program, to the fleet five years ahead of schedule. The JCC includes expanded ELINT exploitation capability and COMINT signals coverage, new multi-platform COMINT Direction-Finding Capability, and advanced Special Signals-Collection capability.

• **Inspections/repairs:** EP-3Es will be sustained through a series of Special Structural Inspections (SSIs) and Special Structural Inspection-Kits (SSI-Ks). SSIs will be completed on all aircraft. SSI-Ks will be completed on select aircraft meeting criteria as required and will include preemptive replacement of fatigue critical structures.

Status

The EP-3E JCC ORD was approved on 10 June 2005. The JCC Development/Production Contract was awarded on 29 June 2005. The EP-3E will be modernized to a common configuration and sustained until Navy Aerial Common Sensor (ACS) reaches IOC.

Developers

L3 Communications; Waco, Texas
Northrop Grumman; Baltimore, Maryland
Titan; Vienna, Virginia
Aeronixs; Melbourne, Florida
General Dynamics; San Jose, California
Allied Signal; Sunnyvale, California
TRW; Sunnyvale, California
EDO Corporation; San Jose, California
Lockheed Martin; Fort Worth, Texas and Denver, Colorado
Naval Surface Warfare Center (NSWC); Crane, Indiana
NSWC; Dahlgren, Virginia
Naval Aviation Depot; Jacksonville, Florida
AT&T Solutions; Vienna, Virginia
Raytheon; Indianapolis, Indiana

Naval Mission Planning Systems (NavMPS)

Description

NavMPS is a suite of applications that allow aircrew to perform tactical mission planning at the secret level for a wide variety of aviation platforms and air launched weapons. NavMPS consists of the Joint Mission Planning System (JMPS), Tactical Automated Mission Planning System (TAMPS), and the Navy Portable Flight Planning Software (N-PFPS). JMPS is the next generation mission planning system and a collaborative development effort by the Navy, Air Force, Army, and SOCOM that will bring all "stovepipe" legacy DoD mission-planning systems under one program with a common framework. JMPS is a single source for preflight planning including aircraft performance data, fuel planning, route planning, threat assessment, precision and conventional weapons planning, and provides the interface to load mission data onto the aircraft. TAMPS is the legacy Navy/Marine Corps standard unit-level aircraft mission planning system for tactical aircraft. N-PFPS is the Navy/Marine Corps standard flight-planning system that covers non-TAMPS aircraft, primarily the helicopter community.

Status
JMPS began replacing TAMPS in FY 2005. TAMPS is being removed from the Fleet. JMPS will replace PFPS in FY 2008. JMPS Core Architecture commenced development in 1998 and reached IOC in FY 2004. JMPS was incorporated into the expeditionary warfare planning capability in FY 2006

Developers
British Aerospace; Camarillo, California
USAF 46TS/TYBRIN; Fort Walton, Florida
Northrop Grumman; San Pedro, California

Submarine Systems

Common Submarine Radio Room (CSRR)

Description
The CSRR modernizes the radio rooms on *Seawolf* (SSN 21), *Ohio* (SSBN 726, SSGN 726), and *Los Angeles* (SSN 688)-class submarines based on the Exterior Communications System (ECS) architecture in development for *Virginia* (SSN 774)-class submarines. The system includes up to two High Data Rate (HDR) and/or up to two OE-538 Multi-function Masts (total of two masts per ship) for enhanced wideband connectivity. A common approach to submarine radio room modernization provides the submarine force with the added benefit of common training, common logistics, and common technical insertion.

Status
There are currently seven submarines, spanning three classes, installed with the CSRR design. All class submarines are to be backfitted by FY 2019.

Developers
Lockheed Martin; Eagan, Minnesota
Naval Undersea Warfare Center; Newport, Rhode Island
Space and Naval Warfare Systems Center; San Diego, California

Submarine High Data-Rate Antenna (HDR)

Description
The submarine HDR antenna program is a top-priority submarine C4I initiative and is the Navy's first multi-band dish antenna. The HDR antenna provides the submarine force with worldwide high data-rate satellite communications capability. It enables the submarine to access the secure, survivable Joint MILSTAR Satellite Program in the Extremely High Frequency (EHF) band. It also

provides the capability to receive time critical tactical information from the Global Broadcast Service (GBS). Additionally, the HDR antenna will provide access to the Defense Satellite Communications System (DSCS) in the Super High Frequency (SHF) band.

Status
The HDR Antenna is currently installed on fast attack submarines, with all submarines being outfitted by FY 2009. SHF FOT&E is scheduled for FY 2009 with the implementation of SHF FOT.

Developers
Raytheon; Marlboro, Massachusetts

Submarine Local Area Network (SubLAN)

Description
SubLAN provides separate secret, top secret, SCI, and unclassified LANs with full network services and connectivity. It integrates non-tactical subsystems and applications, including Task Force Web's Navy Enterprise Portal and back-fit versions of *Virginia* (SSN 774)-class Web-enabled "paperless ship" applications. It accommodates hardware/software upgrade and technology insertion for the life of the ship. SubLAN provides end-to-end connectivity for all tactical and non-tactical subsystems, enabling battle force/JTF interoperability and enables ship-wide access to the common operating picture, JWICS/SIPRNET/NIPRNET e-mail and Web browsing, battle force chat, and other collaborative tools.

Status
SubLAN 1 installations commenced in FY 2004 and will complete in FY 2011. SubLAN 2 installations will commence in FY 2009 and are planned to complete in FY 2015.

Developers
Naval Undersea Warfare Center; Newport, Rhode Island
Space and Naval Warfare Systems Command Systems Center; San Diego, California
Science Applications International Corporation; Sterling, Virginia

Surface and Expeditionary Systems

Advanced Combat Direction System (ACDS)

Description
ACDS is a centralized, automated command-and-control system. An upgrade from the Naval Tactical Data System (NTDS) for aircraft carriers and large-deck amphibious ships, it provides the

capability to identify and classify targets, prioritize and conduct engagements, and exchange targeting information and engagement orders within the battle group and among different service components in the joint theater of operations via tactical data links. ACDS is a core Sea Shield component of non-Aegis/non-SSDS combat systems.

Status

Development is complete. Most legacy ACDS ships will transition to Ship Self Defense System but several ACDS Block 0/1 ships will remain in that configuration until they are decommissioned. Navy will improve and sustain FORCENet interoperability through the Common Network Interface (CNI). CNI is being installed in the remaining ACDS Block 0 LHA/LHDs to augment the expeditionary strike group command staff with operational situational awareness by improved networking and consolidation of disparate applications. One of the most important applications CNI enable in ACDS ships is the Single Integrated Air Picture (SIAP) Integrated Architecture Behavior Model (IABM). This joint application will provide for common distributed processing of air tracks with all CEC and IABM-equipped units in the joint force.

Developers

Raytheon; San Diego, California
Raytheon Space and Naval Warfare Systems Center; San Diego, California
General Dynamics Advance Information Systems; Fairfax, Virginia
Naval Surface Warfare Center; Dahlgren, Virginia
Combat Direction System Center; Dam Neck, Virginia
Naval Surface Warfare Center; Port Hueneme, California

Cooperative Engagement Capability (CEC)

Description

CEC has demonstrated significantly improved battle force air defense capabilities by integrating sensor data of each cooperating ship and aircraft into a single, real-time, fire-control-quality, composite track picture. CEC is a critical pillar of Naval Integrated Fire Control-Counter Air (NIFC-CA) capability and will provide a significant contribution to the Joint Integrated Fire Control operational architecture. CEC interfaces the weapons capabilities of each CEC-equipped ship in the strike group to support integrated engagement capability. By simultaneously distributing sensor data on airborne threats to each ship within a strike group, CEC extends the range at which a ship can engage hostile tracks to beyond the radar horizon, significantly improving area, local, and self-defense capabilities. Already today, CEC enables a strike group or joint task force to act as a single, geographically distributed combat system. CEC provides the fleet with greater defense in-depth and the

mutual support required to confront evolving threats of anti-ship cruise missiles and theater ballistic missiles.

Status
IOC for the shipboard CEC system (USG-2) was declared in FY 1996. TECHEVAL and OPEVAL were successfully completed between 1998-2001 following extensive development and testing of shipboard combat systems with which CEC interfaces. In his report, Commander, Operational Test and Evaluation Force declared shipboard CEC ready for fleet use. In April 2002, the Defense Acquisition Board (DAB) approved production for USG-2 shipboard and USG-3 airborne equipment sets. In September 2003, USD (AT&L) approved FY 2004/FY 2005 follow on production for the USG-3. CEC systems are at sea in 41 ships (Aegis CGs and DDGs, carriers, and amphibious) and 24 E-2C Hawkeye 2000 aircraft. Total future CEC installation is planned in approximately 250 ships, aircraft and land units including E-2D Advanced Hawkeye aircraft, CVN 21, and DDG 1000 ships. Navy revised the CEC acquisition strategy in August 2004 to achieve overall system cost, size, weight, power and cooling reductions and open architecture initiatives promoting Single Integrated Air Picture (SIAP) common track management capability and sensor fusion initiatives. Navy is also coordinating with Joint Staff and OSD to explore potential multi-Service avenues for CEC capability implementation that will expand sensor netting track data availability to meet a variety of warfighter requirements across various platforms including ground mobile systems such as the Army's Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS).

Developers
Johns Hopkins University, Applied Physics Laboratory; Laurel, Maryland
Raytheon Systems Company; St. Petersburg, Florida

SCI Networks

Description
SCI Networks (previously known as TACINTEL II/SCI ADNS) is an IP-capable, network-centric, automated, communication system for real-time receipt and transmission of Special Intelligence (SI) and Sensitive Compartmented Information (SCI) data while satisfying established Information Assurance (IA) Computer Security criteria. SCI Networks provides secure and reliable IP communications for Cryptologic, Intelligence, and Information Operations (IO) systems supporting strike group commanders including Direction Finding (DF) Data Transfer, Record Messaging, E-Mail, Chat, File Transfer and Web Browsing. SCI Networks uses open-architecture standards and is thus a critical element in the Navy's evolving concept of network-centric warfare. The full capability will include voice, video and data transfer among SCI-

capable ships and submarines, with gateways to shore nodes. Under the submarine phase of the program, SCI Networks brings the top secret enclave to submarines in addition to the SCI enclave. SCI Networks is the lead program for implementing the SI/SCI portion of the Joint Maritime Communications Strategy (JMCOMS) under the C4I Networks initiative.

Status
Installation of the Shore Network Operations Center Facilities is complete and the Defense in Depth DCID 3/6 security upgrades was completed in FY 2005. Installation of Build 2 ship hardware began in FY 1999 and was completed early in FY 2003. Software Release 2.2 began fielding in second quarter FY 2003 and reached FOC in FY 2005. A Milestone III full-rate production decision was approved on 4 October 2001. Incremental hardware and software upgrades scheduled through FY 2005 and beyond will provide the following capabilities: Defense in Depth security, Submarine Version (includes the TS Enclave), Packet Prioritization, Direct Ship-to-Ship Network Services, Quality of Service, Interface to Defense Messaging System (DMS), an Interface Afloat to DMS, VoIP and an Airborne EDM version. A Maintenance Modification to address the WINDOWS NT End of Life security issue will be executed between FY 2006 and FY 2009. To realize the FORCENet architecture, FY 2008 through FY 2012 program funds will procure and incorporate Increment 1 capabilities necessary to implement the emerging DoD/Joint architecture enabling SCI Networks to continue providing rapid, reliable, and secure SI communications to the Fleet well into the future.

Developers
Science Applications International Corporation; Arlington, Virginia

Ship Signal Exploitation Equipment (SSEE) Increment E

Description
The SSQ-137 SSEE Increment E is a Shipboard Information Warfare program that provides commanders with threat search and identification information and electronic attack options. SSEE provides deployed forces with an afloat IW sensor. SSEE is a COTS/NDI program that is easily reconfigured and therefore able to respond rapidly to tasking. The system design permits the rapid insertion of new and emerging technologies that will integrate capabilities from existing systems and advanced technologies into a single, scalable, spirally developed, interoperable system.

Status
SSEE Increment E is in full-rate production.

Developers
Argon-ST; Fairfax, Virginia

Single Integrated Air Picture (SIAP)/Integrated Architecture Behavior Model (IABM)

Description

The SIAP (the air track portion of the common operational picture) consists of common, continuous, and unambiguous tracks of airborne objects. The SIAP is achieved by real-time and near real-time data processed identically throughout the force in systems behaving consistent with the IABM and consists of correlated air tracks (one object = one track) and associated track attribute information. IABM is being developed in conjunction with the Joint Program Office–SIAP. This deployable SIAP capability satisfies requirements mandated by the Global Information Grid (GIG), Theater Air and Missile Defense (TAMD) and Combat Identification (CID) Capstone Requirements Documents (CRDs).

Status

The SIAP effort facilitates Aegis, SSDS, and E-2 engineering communities in determining engineering impacts based on the planned scope of IABM integration. To date, the IABM has successfully conducted a System Requirements Review (SRR) and System Functional Review (SFR). The designated Navy pathfinder programs for IABM integration are Aegis, E-2 Hawkeye, and SSDS. The Navy will continue systems engineering efforts with planned fielding in the 2012-2014 time-frame.

Developers

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